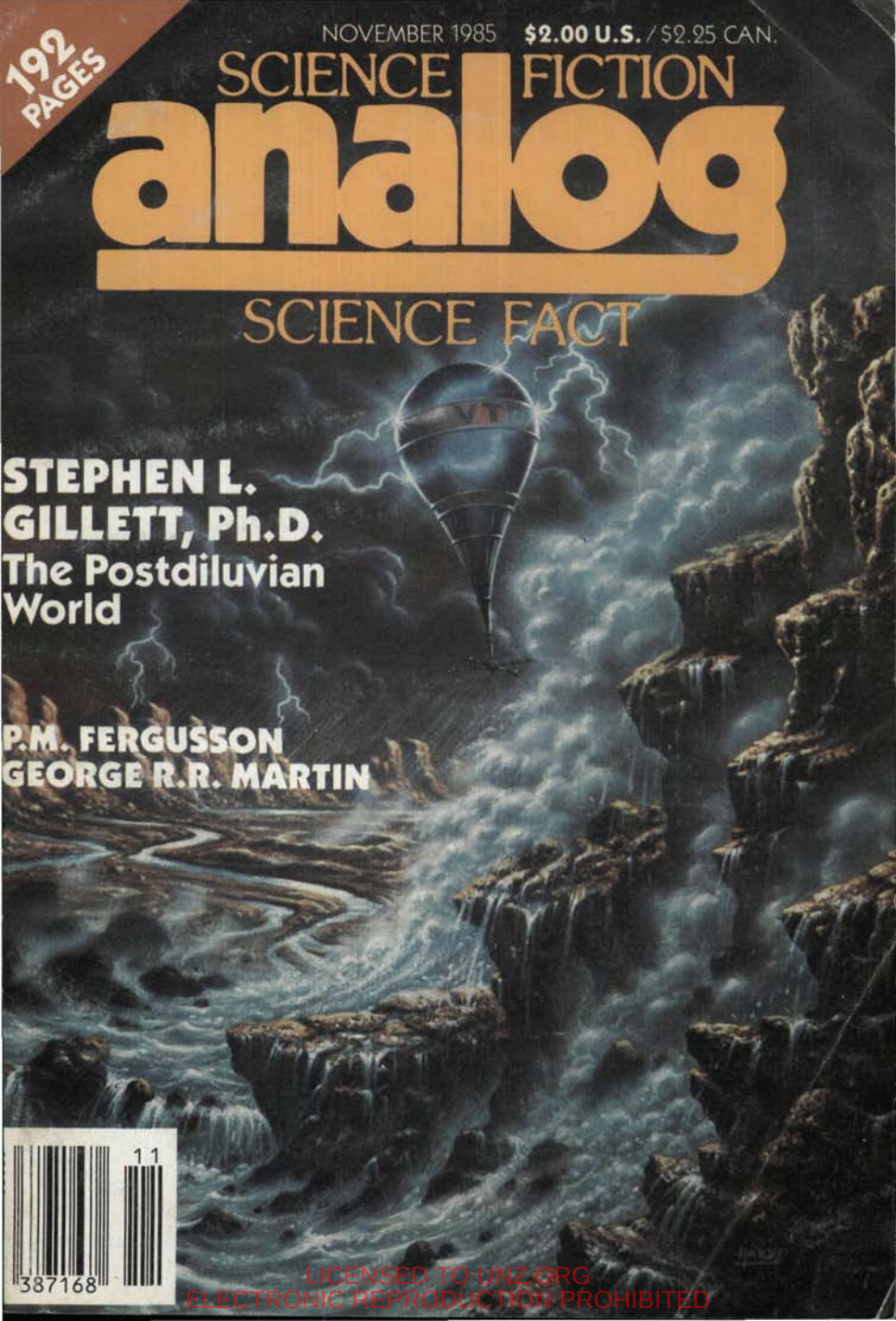
NOVEMBER 1985 $2.00 U.S. / $2.25 CAN.

192 PAGES

SCIENCE FICTION analog SCIENCE FACT



STEPHEN L. GILLETT, Ph.D.
The Postdiluvian World

P.M. FERGUSSON
GEORGE R.R. MARTIN

11
387168

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

TWILIGHT: 2000

A Major New Role-Playing Challenge: *Survival in a War-Torn World*

Welcome to 2000 AD. World War III began five years ago. It's still going on, but that's the least of your problems. A few days ago, you were soldiers in the U.S. 5th Division. Now you're just fighting to survive.

Your equipment was brand new in 1995; now it's wearing out. Gasoline is rare, so your vehicles run on alcohol you distill yourself. And 5th Division's cavalry—when there was a 5th Division—rode horses. There's not much government left, just warlords, marauders, and free cities. Even the major powers are collapsing; whole divisions are refusing orders and heading home.

Your division is gone, and you're hundreds of kilometers inside enemy territory; fortunately, the Soviets aren't in much better shape than you are.

Your job is to stay alive, find enough fuel and spare parts to keep moving, get home (wherever that is), and maybe even strike at the enemy.

Twilight: 2000 is a major new roleplaying game, with new systems covering combat (from hands to tanks), skills and tasks, survival, encounters and NPC motives, and a great variety of equipment. It also contains extensive background information on the war and the current state of central Europe.

$18 at your local hobby shop or direct from GDW. (Add $1 for handling.) Send $1 for our catalog.

GDW Game Designers' Workshop
P.O. Box 1646
Bloomington, Illinois 61702-1646

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

DAW BOOKS
makes its spectacular
hardcover debut
with a swashbuckling
adventure tale from
two-time Hugo Award
Winner C.J. Cherryh!

Angel With The Sword

by C.J. Cherryh

"A great event... C.J. Cherryh just keeps getting better and better."—*Marion Zimmer Bradley*

"Love, intrigue and action in a setting so well realized you can see, feel, taste and smell it."
—*Roger Zelazny*

"An exciting story...vividly realized in all four dimensions...an enchanting heroine. I'm in love with Altair Jones!"
—*Poul Anderson*

"When a novel is this good, the reader inevitably wants to go back again!"—*Anne McCaffrey*

$15.95 A DAW BOOKS Hardcover

The Exclusive Science Fiction and Fantasy Line Selected by DONALD A. WOLLHEIM

Distributed by NAL
NEW AMERICAN LIBRARY

a

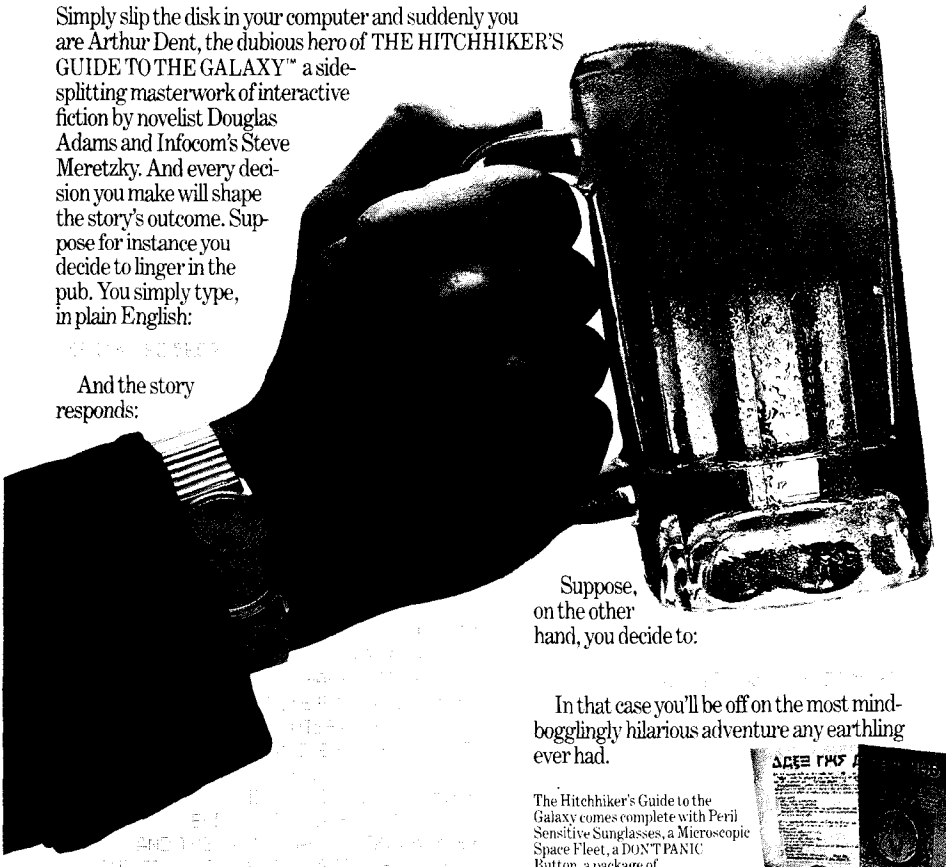
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Earth will be destroyed in 12 minutes to make way for a hyperspace bypass.

Should you hitchhike into the next galaxy? Or stay and drink beer?

Simply slip the disk in your computer and suddenly you are Arthur Dent, the dubious hero of THE HITCHHIKER'S GUIDE TO THE GALAXY™ a side-splitting masterwork of interactive fiction by novelist Douglas Adams and Infocom's Steve Meretzky. And every decision you make will shape the story's outcome. Suppose for instance you decide to linger in the pub. You simply type, in plain English:

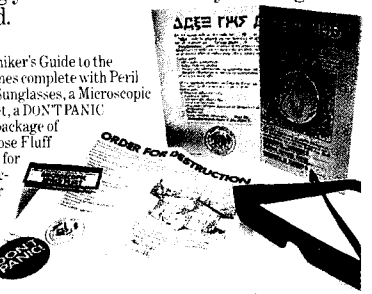
And the story responds:



Suppose, on the other hand, you decide to:

In that case you'll be off on the most mind-bogglingly hilarious adventure any earthling ever had.

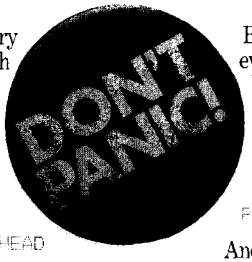
The Hitchhiker's Guide to the Galaxy comes complete with Peril Sensitive Sunglasses, a Microscopic Space Fleet, a DON'T PANIC Button, a package of Multipurpose Fluff and orders for the destruction of your home and planet.



b

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

You communicate – and the story responds – in full sentences. Which means that at every turn, you have literally thousands of alternatives. So if you decide it might be wise, for instance, to wrap a towel around your head, you just say so:



>WRAP THE TOWEL AROUND MY HEAD

And the story responds:

THE RAVENOUS FROBOZZ MAGIC MAN-EATING BEAST IS UNABLE TO SEE YOU, BECAUSE IT HAS GOT SO MUCH OF YOUR OWN BLOOD IN ITS EYES FROM BUTTING ITS HEAD AGAINST THE WALL TRYING TO GET AT YOU.

But be careful about what you say. Or one moment you might be strapped down, forced to endure a reading of the third worst poetry in the galaxy; the next you could be hurtling through space with Marvin the Paranoid Android aboard a stolen spaceship.

And simply staying alive from one zany situation to the next will require every proton of puzzle solving prowess your mere mortal mind can muster. Even simple tasks can put you at wit's end:

And the story responds:

Other interactive science fiction stories from Infocom include PLANETFALL," in which you're stranded on a mysterious deserted world. STARCROSS," a puzzling challenge issued eons ago and light-years away. SUSPENDED," the race to stabilize an entire planet's life support systems. And A MIND FOREVER VOYAGING," a radically new work of serious science fiction in which you explore the future of mankind.

But don't panic. You'll be accompanied every light-year of the way by your trusty Hitchhiker's Guide, which you can always depend on for up-to-the-nanosecond information. Well, almost always:

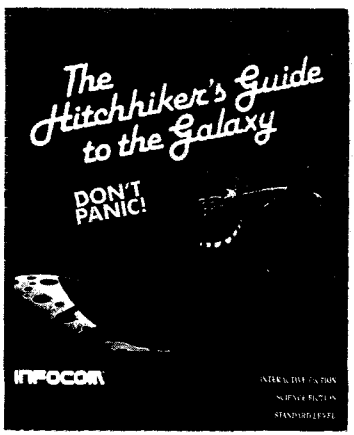
>CONSULT THE HITCHHIKER'S GUIDE ABOUT THE MILLIWULAR HYPERSPACE FINCH

And the story responds:

[illegible]

So put down that beer, take that towel off your head, open the door, hitchhike down to your local software store today and pick up THE HITCHHIKER'S GUIDE TO THE GALAXY. Before they put that bypass in.

Still not convinced? Try our Sampler Disk which includes portions of four different types of stories for a paltry $7.95. If it doesn't get you hooked on the addictive pleasures of Infocom, return it for a full refund. If it does, you can apply the price toward any Infocom story. You can't lose!



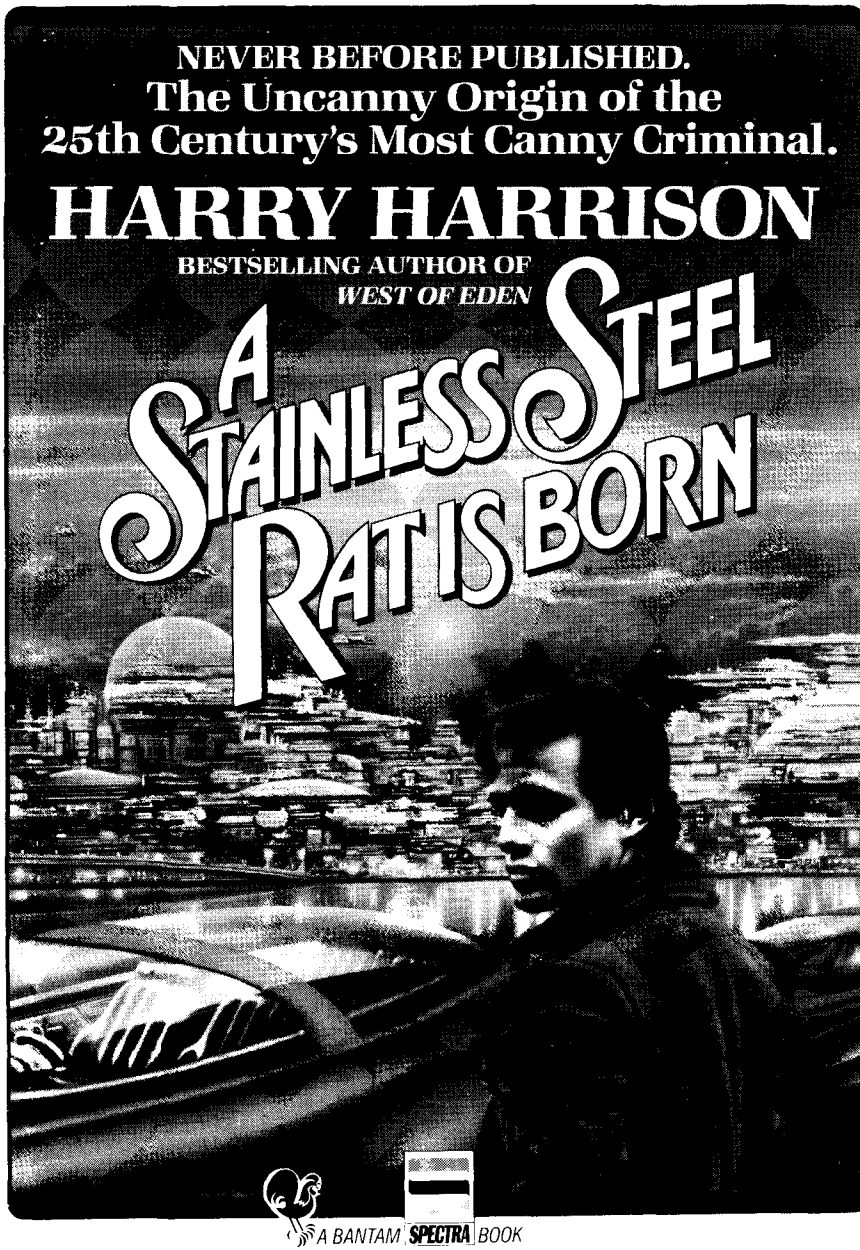
INFOCOM

For more information call 1-800-262-6868. Or write to us at 125 Cambridge Park Dr., Cambridge, MA 02140.

©1985 Infocom. THE HITCHHIKER'S GUIDE TO THE GALAXY is a trademark of Douglas Adams. PLANETFALL, STARCROSS, SUSPENDED and A MIND FOREVER VOYAGING are trademarks of Infocom.

C

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



d

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

analog

12

102

116

Vol. CV, No. 11
November, 1985

Next Issue On Sale
October 8, 1985

$19.50 per year in U.S.A.
$2.00 per copy in U.S.A.

Novelettes

THE ROAD NOT TAKEN, Harry Turtledove ____ 12
SECOND HELPINGS, George R.R. Martin ____ 70
THE DARKLING PLAIN, P.M. Fergusson ____ 142

Science Fact

THE POSTDILUVIAN WORLD, Stephen L. Gillett, Ph.D ____ 40

Short Stories

THE EFFICIENCY EXPERT, W.R. Thompson ____ 60
RANDOM SAMPLE, Heidi Heyer ____ 102
SIBLINGS, Larry Powell ____ 116
BÉISBOL, Ben Bova ____ 134

Reader's Departments

THE EDITOR'S PAGE ____ 4
IN TIMES TO COME ____ 101
ON GAMING, Dana Lombardy ____ 115
THE ALTERNATE VIEW, G. Harry Stine ____ 130
BIOLOG, Jay Kay Klein ____ 178
THE REFERENCE LIBRARY, Tom Easton ____ 179
BRASS TACKS ____ 187
THE ANALOG CALENDAR OF UPCOMING EVENTS ____ 192

Cover by David Hardy

Joel Davis, President & Publisher

William F. Battista, Associate Publisher

Stanley Schmidt
Editor

Shelley Frier
Associate Editor

Terri Czeczko
Art Editor

Indicia on Page 8

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

L. RON HUBBARD'S

THE INVADERS PLAN

UNKNOWN...UNRECOGNIZED... THE ALIENS ALREADY WALK AMONG US...

Secret invaders from the remote reaches of space — here ... now to add Earth to their vast Voltarian empire.

From L. Ron Hubbard the supreme master of story telling adventure ... action ... excitement comes his newest — biggest — most daring bestseller:

THE INVADERS PLAN

Capturing the immense sweep of time and space ... of intrigue and conflict ... of planets and empires caught on the jaws of fate.

Told as only L. Ron Hubbard can tell it with a unique twist, through the eyes of the Voltarian invaders, themselves.

A stunning blend of high drama and incisive comedy satire from the giant of science fiction, who gave us the International Bestseller "Battlefield Earth."

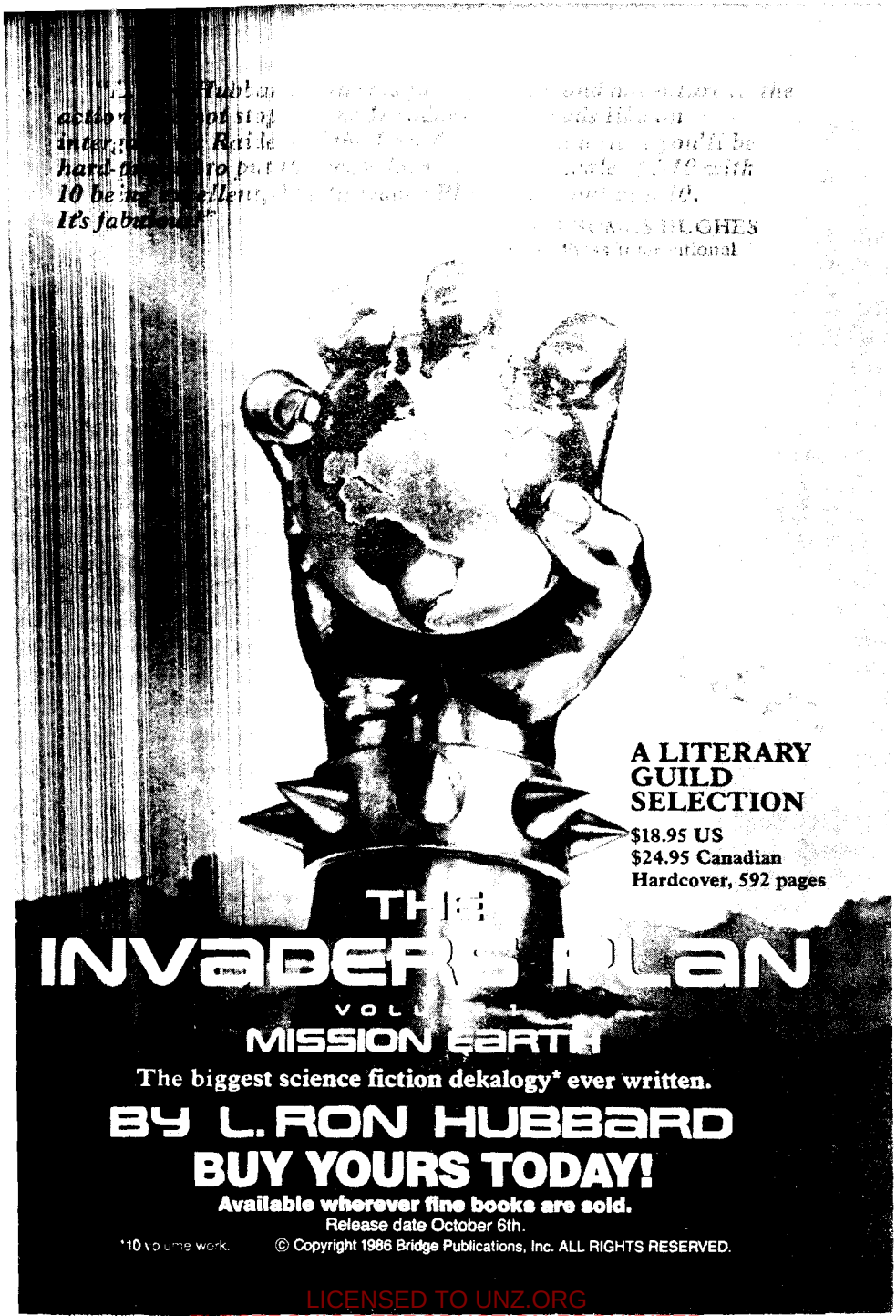
"...a big, humorous tale of interstellar intrigue in the classical mold. I fully enjoyed it!" **ROGER ZELAZNY**

"An incredibly good story, lushly written, vibrating with action and excitement. A gem." **A. E. VAN VOGT**

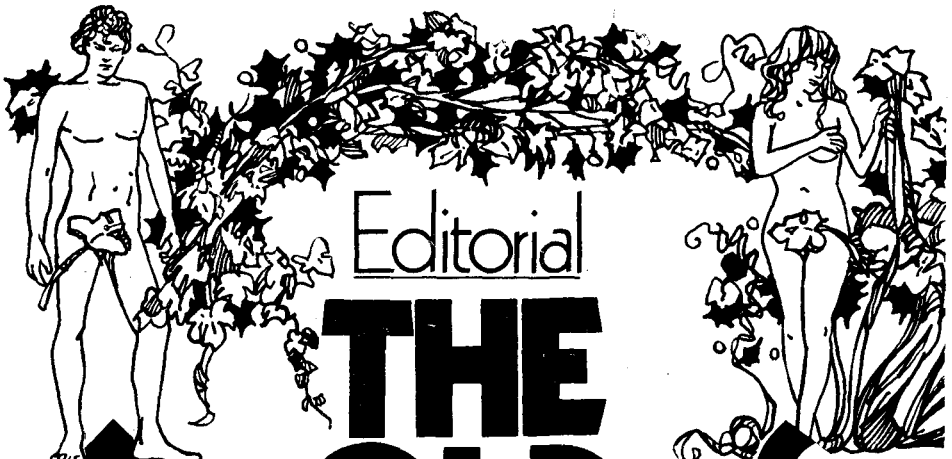
Bridge Publications, Inc.,

1414 North Catalina Street, Los Angeles, Ca. 90027, Tel. (213) 382-0382

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Editorial

THE OLD REFRAINS

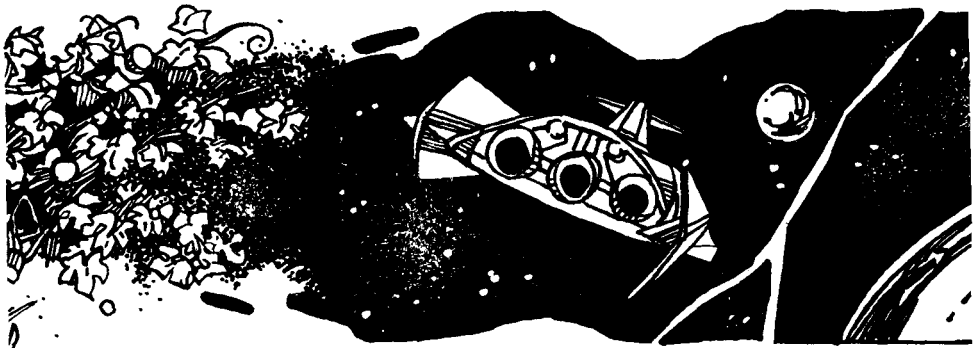
Stanley Schmidt

When my esteemed colleague and predecessor Ben Bova was turning over the reins of *Analog* he warned me that I could expect to see several submissions a month with the surprise ending, "And his name was Adam and hers was Eve"—and that I would seldom find this surprising. He was right on both counts. In the ensuing years I've seen the number of Adam and Eve stories fall off somewhat, but new clichés have risen to take their place, and others just go on and on. My term as editor has largely coincided with the blossoming popularity of computer games, so it's hardly surprising that the plots I've seen most overworked are what we know in the office as "Computer Game Plot A" and "Computer Game Plot B." Plot A ends, "And it was all just a game." Plot B ends, "And it wasn't a game after all."

And I can almost always recognize either before I finish the first paragraph.

Usually in these editorials I talk about ideas of the kind science fiction ex-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



plores, about the universe and its inhabitants, rather than about science fiction itself. However, since *Analog* readers tend to be thinking folk and many of them at least occasionally try their hands at writing their own stories, from time to time I like to say something about how they might enhance their chances of *selling* me a story. I have ulterior motives, too, of course. I would like to continue making *Analog* better and better—and since I have to *read* all the manuscripts submitted, I'd like as many as possible of them to be *fun* to read. Ideally, I'd like to see so many strikingly good stories that I find it very difficult to decide which ones to buy.

It's only fair to warn you that the competition is already pretty tough—but I'd like to see it get even tougher. There are some extremely talented people writing for *Analog*; over half of the stories nominated for this year's Hugo awards first appeared here. But none of those writers has a guarantee that his next story has a place waiting for it in *Analog*. If you can write a better story than they can, I'll cheerfully take yours instead (and thereby challenge them to write a still better one next time). If you have any doubt that these pages really are open to new writers, I need only point that nearly half of those *Analog*-born Hugo nominees were by writers who emerged from our "slush pile" within the last very few years—and two of them were first stories by previously unknown writers.

What does it take? Well, a great many stories are sent home not because of anything clearly and appallingly wrong with them, but simply because I don't see anything in them fresh enough and special enough to make them stand out from 99% of the competition. Given our fixed number of pages and the volume of submissions we get, that's just about what it takes. Now, I have no doubt that the author of each and every one of those Adam and Eve, Computer Plot A, and Computer Plot B stories honestly believed that the idea was fresh, original, and surprising. No doubt it *was* original in the sense that he or she thought of it independently, unaware that hundreds of other people had already done so. One way to avoid that problem is to familiarize yourself with as much as possible of the science fiction that has already been published, since many of the ideas that occur to lots of people have long since been published in one or more versions. It's to any would-be writer's advantage to know about

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

these—not to imitate earlier work, but to avoid repeating it. But reading the old stories won't necessarily warn you against *all* the clichés. I suspect there are some which *I* see often because they occur to hundreds of people, but *you* don't because they're not strong enough to generate many memorable stories—so they're often written but seldom published.

For that reason, and since it's difficult for most writers to believe that their brainchildren are *really* not unique, I thought it might be helpful to share with you a sampling of the stories and story elements that I can count on finding on my desk several times *every* month. I *know* that in any given month I'm going to see at least a few of *each* of the following:

Adam and Eve.

Computer Game Plot A.

Computer Game Plot B.

Dismalness after the (usually nuclear) holocaust.

Totalitarian societies that look just like hundreds of other totalitarian societies.

Couples applying for licenses to have a baby.

Individuals applying for permission to live another year.

"Surprise" endings that aren't, including,

"And the planet was Earth!" and

"And the mysterious traveler entering a strange new world was a baby being born!"

"Clone" stories by writers with oddly distorted ideas of what a clone really is.

A great deal of unnecessary, pointless, and ultimately tedious violence and sex.

Time travel and psi stories which add nothing new to venerable formulas; likewise

UFO and Bermuda Triangle stories.

Time travelers or extraterrestrials involved in the John F. Kennedy assassination.

Cryogenically preserved patients awakening into Strange New Futures.

Aliens evaluating *Homo sapiens* as a candidate for extermination, admission to a Galactic Federation, etc.

Aliens finding Pioneer 10 and trying to read the plaque.

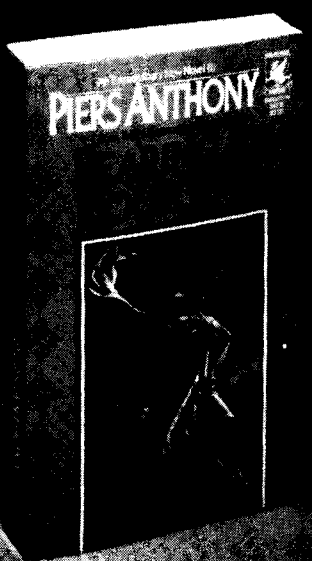
I could go on, but you get the idea. If you can imagine spending most of your work week reading things like that, you can probably imagine also that you would not be thrilled to find yet another which you can tell on the first page is just like the last dozen similar ones you've read. You'll understand that an editor confronted with weekly piles of these sorts of predictability is hungrily seeking something new and fascinating and fun—and if you can provide it, he'll probably jump at it.

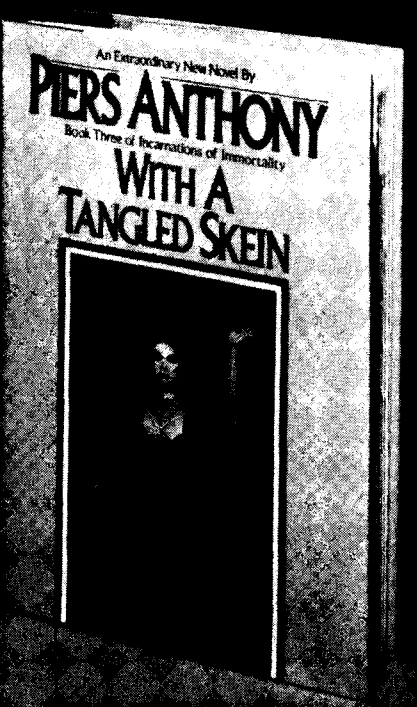
Of course, I should acknowledge in closing that we *have* published computer game stories, post-holocaust stories, time travel and psi stories, and others that you'll recognize from the list above. There are certain stories that most writers seem to have to get out of their systems at one time or another. "Faust" variants have been popular for a *long* time, and a surprising number of frustrated science fiction writers using

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The latest *Incarnations* that began with *On a Pale Horse!*

Piers Anthony's stunning new series takes you to a modern world of magic where God and Satan are real and potent. A world where Death lives—as do Nature, War, Time...and Fate.





SEARING AN HOUR...
Book Two of Incarnations of Immortality

When life seemed [illegible] accepted the position of Time [illegible] though it meant giving [illegible] present to Death.

[illegible] on the Planet of Darkness, [illegible] and his only way to defeat [illegible] by accepting a challenge in Hell.

Both Coming in October.

DEL REY #1 In Science Fiction and Fantasy Published by Ballantine Books

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a time machine to take their work to a more congenial market. (Yes, I did one once.) Having been done so often, these gimmicks are not good bets for impressing editors—but they still can, if they're good enough. That tired old SF-writer-with-time-machine idea, for example, just last year led to Eric G. Iverson's "Hindsight," which drew a lot of enthusiastic comments and made me wish I'd written it—because it did thought-provoking things with the idea that nobody had done before, and went well beyond the mere "novelty" of the idea.

That's what you have to do if you want to get a new story out of an old idea. *Completely* new ideas are very rare, and it's risky to make a story completely dependent on supposed novelty of idea or a surprise ending. Chances are good that many readers will have already seen the idea and/or will guess the ending—so you have to make sure your story has enough meat *beyond* nov-

STANLEY SCHMIDT ..... Editor
SHELLEY FRIER ..... Associate Editor
TINA LEE ..... Editorial Assistant
RALPH RUBINO ..... Corporate Art Director
GERARD HAWKINS ..... Associate Art Director
TERRI CZECZKO ..... Art Editor
CARL BARTEE ..... Director of Manufacturing
CAROLE DIXON ..... Production Manager
LAUREN C. COUNCIL ..... Production Assistant
CYNTHIA MANSON ..... Director, Subsidiary Rights
MARY ANN GOLDSTONE ..... Manager, Contracts & Permissions
LOUISE MUGAR .... Circulation Director/ Retail Marketing
JAY BRESNEHAN ..... Circulation Planning Director
PRISCILLA GARSTON ..... Circulation Director/ Subscriptions
CHRIS DORBANDT ... Newsstand Operations Manager
WILLIAM F. BATTISTA ..... Advertising Director
JAMIE FILLON ..... Advertising Manager
IRENE BOZOKI ..... Classified Ad Manager

JOEL DAVIS
President & Publisher

LEONARD F. PINTO
Vice President & General Manager

PAULA COLLINS
Vice President Circulation

FRED EDINGER
Vice President Finance

ADVERTISING OFFICES
NEW YORK
(212) 557-9100

Analog Science Fiction Science Fact is published 13 times annually by Davis Publications, Inc. at $2.00 a copy in U.S.A., $2.95 in Canada. Annual subscription $19.50 in the U.S.A. and possessions, in all other countries, $24.20 payable in advance in U.S. funds. First copy of new subscription will be mailed within eight weeks of receipt of order. When reporting change of address allow 6 to 8 weeks and give new address as well as the old address as it appears on the last label. Second-class postage paid at New York, NY, and at additional mailing office. Canadian 3rd class postage paid at Windsor, Ontario.

© 1985 by Davis Publications, Inc., all rights reserved. Protection secured under the Universal Copyright Convention. Reproduction or use of editorial or pictorial content in any manner without express permission is prohibited. All stories in this magazine are fiction. No actual persons are designated by name or character. Any similarity is coincidental. Printed in U.S.A. All submissions must be accompanied by stamped self-addressed envelope, the publisher assumes no responsibility for unsolicited manuscripts or artwork.

POSTMASTER: SEND FORM 3579 to ANALOG SCIENCE FICTION/SCIENCE FACT, P.O. BOX 1936, MARION, OH 43306
IN CANADA RETURN TO 698 MONMOUTH ROAD, WINDSOR, ONTARIO N8Y 3L1
Editorial and Advertising: Analog Science Fiction/Science Fact, 380 Lexington Avenue, New York, NY 10017
Subscriptions: Analog Science Fiction/Science Fact, P.O. Box 1936, Marion, OH 43306 ISSN 0161-9328
call (614) 383-3141 for problems with your subscription

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

elty and surprise so that even those readers feel enriched by reading it. Do that, and you can even sell me a game story. I *have* bought a few—but most of those have been special enough to win major awards and get picked for "Best of the Year" anthologies. If you're planning to write one of those stories on my little list, bear in mind that it will have to be that special to make the grade.

A new twist or new insight based on an old idea can sometimes do it; so can peopling the story with remarkably engaging, memorable characters. But that's not easy; and if you can go beyond that—if you *can* come up with a really, fundamentally new idea—that's even better. ■

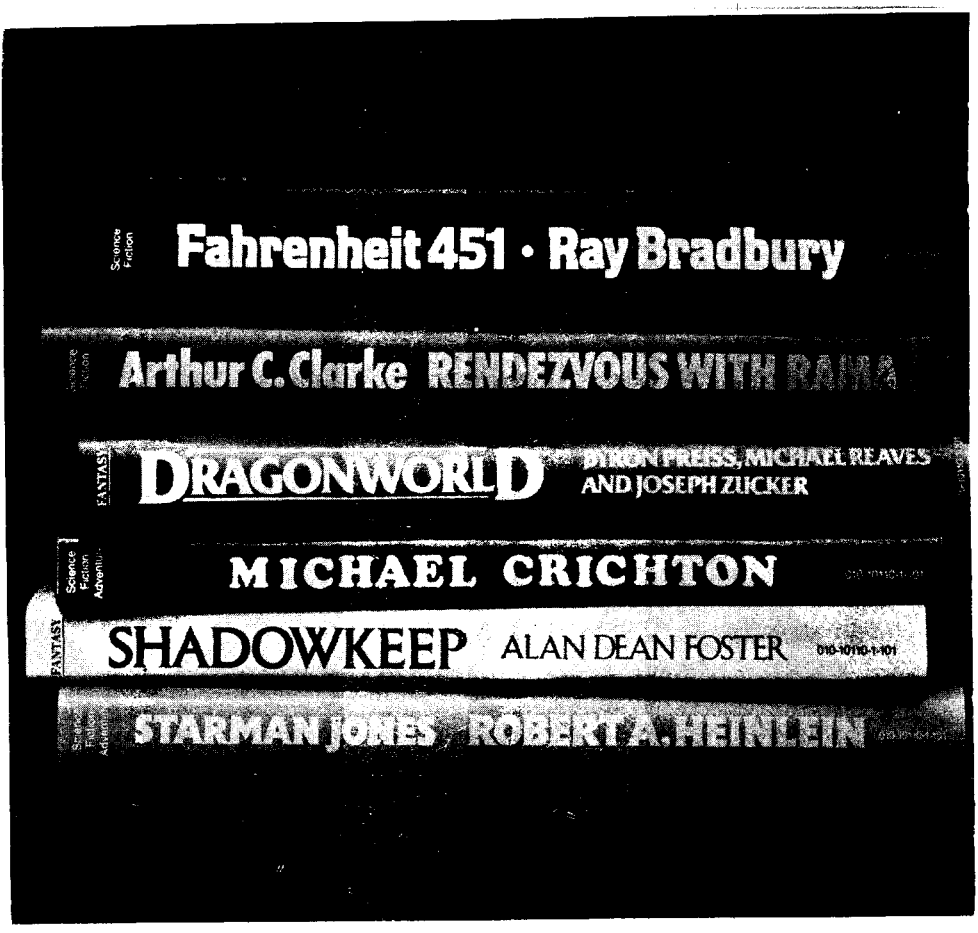
RIDDLE NIGHT AT CALLAHAN'S PLACE

The following is a sort of "retranslation" game, devised by Mr. Michael Callahan (proprietor of CALLAHAN'S CROSSTIME SALOON) for the amusement of his patrons. You may have heard of the computerized-translator that rendered "Out of sight, out of mind" as "Invisible idiot." All of the following encodings represent the names of well-known science fiction writers or editors, mistranslated by a computer that is not hip to homonyms. You, the computer troubleshooter, must figure out what the machine *meant* to say. If, for instance, the category were Film Stars instead of SF Stars, the computer might print out: "Chicken coop; more loving," and only an astute observer would decipher this as "Hennery; fonder" or Henry Fonda. Similarly, "Holler; stead, depart, witness" is the computer's way of saying "Bellow; lieu, go, see" (Bela Lugosi), and "Grass; apprentice; younger" equals "Lawn; trainee; junior" (Lon Chaney, Jr.). The computer employs semicolons to separate first name from second, and commas to separate the individual component syllables of a single name.

Four years ago I incorporated a version of this contest into a Callahan's Place yarn, "Pyotr's Story," and offered a chit good for a free drink at Callahan's to each reader who correctly answered all the riddles. Although the contest closed long since, responses continue to come in to this day, from all

(continued on page 69)

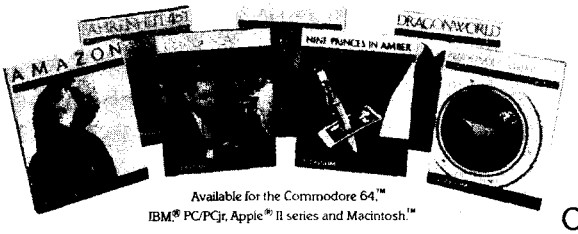
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Booted up any good books lately?

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Introducing Telarium™ interactive software.



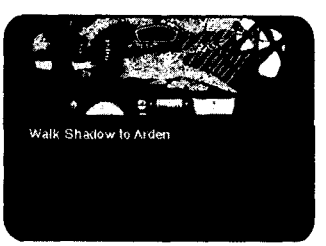
Available for the Commodore 64,™
IBM® PC/PCjr, Apple® II series and Macintosh.™

Maybe you've wondered what kind of software a giant like Bradbury or Crichton or Clarke could dream up. Maybe you've wondered what it would be like to be the hero in one of their mind-boggling adventures.

Or maybe you've just wondered if you'd ever see software that knocks you right out of your seat – and literally lands you in a whole new world.

Well, now you can stop wondering. Because now there's Telarium. An entire line of games produced in collaboration with the greatest science fiction authors of our century. An entire line of the most challenging, most exciting, most rewarding adventures ever created. Adventures that put you right in the center of action – and completely in command.

Only Telarium gives you programs like **Nine Princes in Amber,**™ Roger Zelazny's fantasy adventure about one man's struggle for the throne of the one true perfect world. Only Telarium combines a line of classic fiction with state-of-the-art interactive features – features like full-color graphics, advanced text parsers, and the intense, realistic game play of multiple-disk programs. And only Telarium gives you these benefits in every single game.

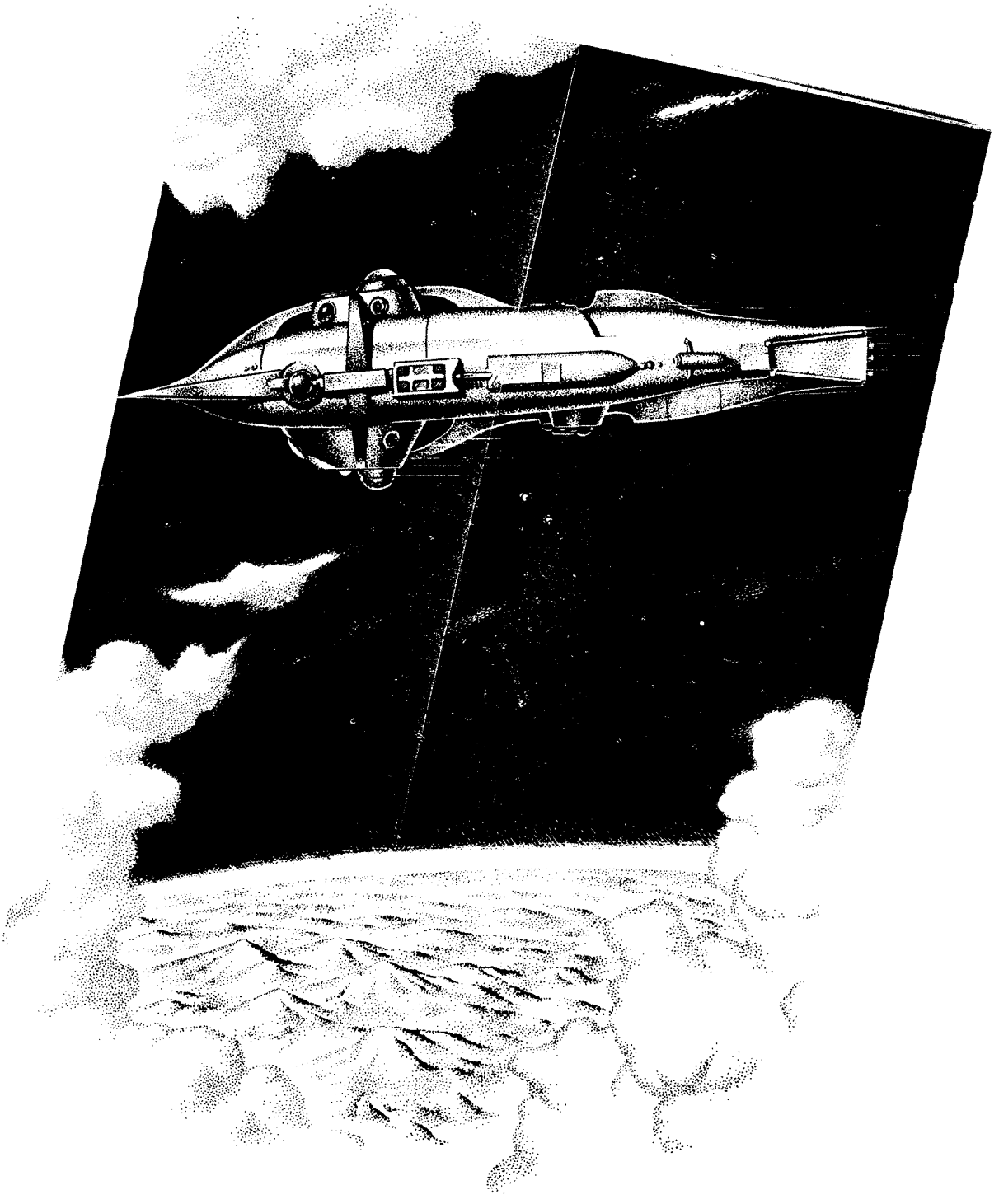


Telarium. We give you more than great software. We give you great books to boot.

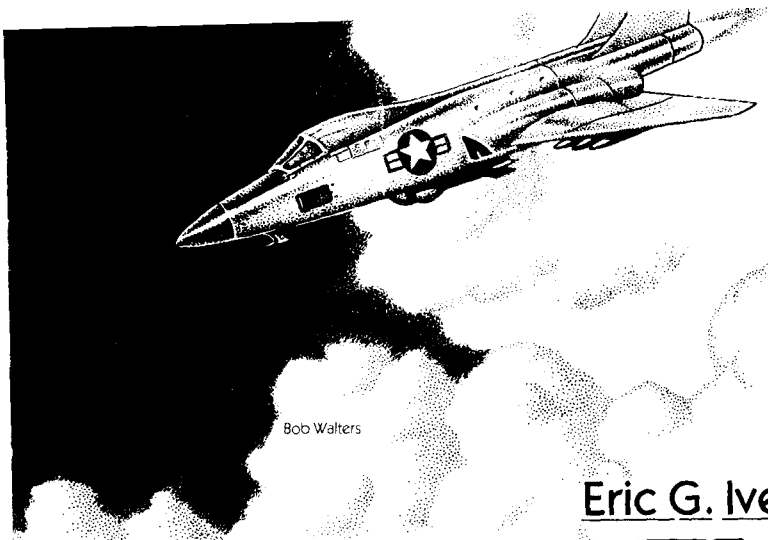
TELARIUM™

© 1985, Telarium Corp. All rights reserved. Apple, IBM PC and PCjr. are registered trademarks of Apple Computer, Inc. and International Business Machines respectively. Commodore 64 and Macintosh are trademarks of Commodore Electronics Limited and Apple Computer, Inc. respectively. SHADOWKEEP, RENDEZVOUS WITH RAMA, DRAGONWORLD, AMAZON, FAHRENHEIT 451, NINE PRINCES IN AMBER and PERRY MASON: THE CASE OF THE MANDARIN MURDER computer programs are trademarks of Telarium Corp.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Eric G. Iverson

THE ROAD NOT TAKEN

For a civilization to achieve any given technology, it must first pass through a series of evolutionary precursors. But suppose there's a shortcut. . . .

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Captain Togram was using the chamberpot when the *Indomitable* broke out of hyperdrive. As happened all too often, nausea surged through the Roxolan officer. He raised the pot and was abruptly sick into it.

When the spasm was done, he set the thundermug down and wiped his streaming eyes with the soft, gray-brown fur of his forearm. "The gods curse it!" he burst out. "Why don't the shipmasters warn us when they do that?" Several of his troopers echoed him more pungently.

At that moment, a runner appeared in the doorway. "We're back in normal space," the youth squeaked, before dashing on to the next chamber. Jeers and oaths followed him: "No shit!" "Thanks for the news!" "Tell the steerers—they might not have got the word!"

Togram sighed and scratched his muzzle in annoyance at his own irritability. As an officer, he was supposed to set an example for his soldiers. He was junior enough to take such responsibilities seriously, but had had enough service to realize he should never expect too much from anyone more than a couple of notches above him. High ranks went to those with ancient blood or fresh money.

Sighing again, he stowed the chamberpot in its niche. The metal cover he slid over it did little to relieve the stench. After sixteen days in space, the *Indomitable* reeked of ordure, stale food, and staler bodies. It was no better in any other ship of the Roxolan fleet, or any other. Travel between the stars was simply like that. Stinks and darkness were part of the price the soldiers paid to make the kingdom grow.

Togram picked up a lantern and shook it to rouse the glowmites inside. They flashed silver in alarm. Some races, the captain knew, lit their ships with torches or candles, but glowmites used less air, even if they could only shine intermittently.

Ever the careful soldier, Togram checked his weapons while the light lasted. He always kept all four of his pistols loaded and ready to use; when landing operations began, one pair would go on his belt, the other in his boottops. He was more worried about his sword. The perpetually moist air aboard ship was not good for the blade. Sure enough, he found a spot of rust to scour away.

As he polished the rapier, he wondered what the new system would be like. He prayed for it to have a habitable planet. The air in the *Indomitable* might be too foul to breathe by the time the ship could get back to the nearest Roxolan-held planet. That was one of the risks starfarers took. It was not a major one—small yellow suns usually shepherded a life-bearing world or two—but it was there.

He wished he hadn't let himself think about it; like an aching fang, the worry, once there, would not go away. He got up from his pile of bedding to see how the steerers were doing.

As usual with them, both Ransisc and his apprentice Olgren were complaining about the poor quality of the glass through which they trained their spyglasses. "You ought to stop whining," Togram said, squinting in from the doorway. "At least you have light to see by." After seeing so long by glowmite lantern, he had to wait for his eyes to adjust to the harsh raw sunlight flood-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ing the observation chamber before he could go in.

Olgren's ears went back in annoyance. Ransisc was older and calmer. He set his hand on his apprentice's arm. "If you rise to all of Togram's jibes, you'll have time for nothing else—he's been a troublemaker since he came out of the egg. Isn't that right, Togram?"

"Whatever you say." Togram liked the white-muzzled senior steerer. Unlike most of his breed, Ransisc did not act as though he believed his important job made him something special in the gods' scheme of things.

Olgren stiffened suddenly; the tip of his stumpy tail twitched. "This one's a world!" he exclaimed.

"Let's see," Ransisc said. Olgren moved away from his spyglass. The two steerers had been examining bright stars one by one, looking for those that would show discs and prove themselves actually to be planets.

"It's a world," Ransisc said at length, "but not one for us—those yellow, banded planets always have poisonous air, and too much of it." Seeing Olgren's dejection, he added, "It's not a total loss—if we look along a line from that planet to its sun, we should find others fairly soon."

"Try that one," Togram said, pointing toward a ruddy star that looked brighter than most of the others he could see.

Olgren muttered something haughty about knowing his business better than any amateur, but Ransisc said sharply, "The captain has seen more worlds from space than you, sirrah. Suppose you do as he asks." Ears drooping dejectedly, Olgren obeyed.

Then his pique vanished. "A planet with green patches!" he shouted.

Ransisc had been aiming his spyglass at a different part of the sky, but that brought him hurrying over. He shoved his apprentice aside, fiddled with the spyglass' focus, peered long at the magnified image. Olgren was hopping from one foot to the other, his muddy brown fur puffed out with impatience to hear the verdict.

"Maybe," said the senior steerer, and Olgren's face lit, but it fell again as Ransisc continued, "I don't see anything that looks like open water. If we find nothing better, I say we try it, but let's search a while longer."

"You've just made a *luof* very happy," Togram said. Ransisc chuckled. The Roxolani brought the little creatures along to test new planets' air. If a *luof* could breathe it in the airlock of a flyer, it would also be safe for the animal's masters.

The steerers growled in irritation as several stars in a row stubbornly stayed mere points of light. Then Ransisc stiffened at his spyglass. "Here it is," he said softly. "*This* is what we want. Come here, Olgren."

"Oh, my, yes," the apprentice said a moment later.

"Go report it to Warmaster Slevon, and ask him if his devices have picked up any hyperdrive vibrations except for the fleet's." As Olgren hurried away, Ransisc beckoned Togram over. "See for yourself."

The captain of foot bent over the eyepiece. Against the black of space, the world in the spyglass field looked achingly like Roxolan: deep ocean blue, covered with swirls of white cloud. A

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

good-sized moon hung nearby. Both were in approximately half-phase, being nearer their star than was the *Indomitable*.

"Did you spy any land?" Togram asked.

"Look near the top of the image, below the ice cap," Ransisc said. "Those browns and greens aren't colors water usually takes. If we want any world in this system, you're looking at it now."

They took turns examining the distant planet and trying to sketch its features until Olgren came back. "Well?" Togram said, though he saw the apprentice's ears were high and cheerful.

"Not a hyperdrive emanation but ours in the whole system!" Olgren grinned. Ransisc and Togram both pounded him on the back, as if he were the cause of the good news and not just its bearer.

The captain's smile was even wider than Olgren's. This was going to be an easy one, which, as a professional soldier, he thoroughly approved of. If no one hereabouts could build a hyperdrive, either the system had no intelligent life at all or its inhabitants were still primitives, ignorant of gunpowder, fliers, and other aspects of warfare as it was practiced among the stars.

He rubbed his hands. He could hardly wait for landfall.

Buck Herzog was bored. After four months in space, with five and a half more staring him in the face, it was hardly surprising. Earth was a bright star behind the *Ares III*, with Luna a dimmer companion; Mars glowed ahead.

"It's your exercise period, Buck," Art Snyder called. Of the five-person crew, he was probably the most officious.

"All right, Pancho," Herzog sighed. He pushed himself over to the bicycle and began pumping away, at first languidly, then harder. The work helped keep calcium in his bones in spite of free fall. Besides, it was something to do.

Melissa Ott was listening to the news from home. "Fernando Valenzuela died last night," she said.

"Who?" Snyder was not a baseball fan.

Herzog was, and a California to boot. "I saw him at an old-timers' game once, and I remember my dad and my grandfather always talking about him," he said. "How old was he, Mel?"

"Seventy-nine," she answered.

"He always was too heavy," Herzog said sadly.

"Jesus Christ!"

Herzog blinked. No one on the *Ares III* had sounded that excited since liftoff from the American space station. Melissa was staring at the radar screen "Freddie!" she yelled.

Frederica Lindstrom, the ship's electronics expert, had just gotten out of the cramped shower space. She dove for the control board, still trailing a stream of water droplets. She did not bother with a towel; modesty aboard the *Ares III* had long since vanished.

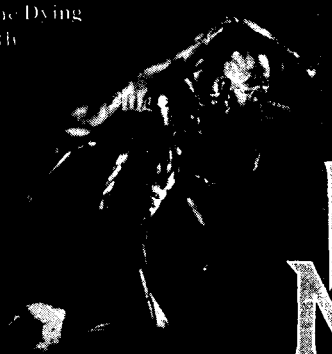
Melissa's shout even made Claude Jonnard stick his head out of the little biology lab where he spent most of his time. "What's wrong?" he called from the hatchway.

"Radar's gone to hell," Melissa told him.

"What do you mean, gone to hell?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Magic, mystery, and masterful writing join in the newest novel of the Dying Earth



THREE MONTHS ON THE *LOCUS* HARDCOVER BESTSELLER LIST

"Vance fans will consider it an instant classic."
—Xignals

"Ceaselessly inventive . . . highly rewarding."
—Science Fiction Chronicle

Rhialto The Marvellous

Jack Vance

HE WAS BORN BEFORE MEN COULD MEASURE TIME BUT HIS DESTINY LAY AMONG THE STARS

In the Face of my Enemy

JOSEPH H. DELANEY

BASED ON THE NOVELLA VOTED ONE OF THE YEAR'S TOP FIVE AT THE 1984 WORLD SCIENCE FICTION CONVENTION

[illegible] • 352 pp • $2.95

Distributed by Simon & Schuster Mass Merchandise Sales Company
1230 Avenue of the Americas • New York, N.Y. 10020

DAW BOOKS

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Jonnard demanded indignantly. He was one of those annoying people who thought quantitatively all the time, and thought everyone else did, too.

"There are about a hundred, maybe a hundred fifty, objects on the screen that have no right to be there," answered Frederica Lindstrom, who had a milder case of the same disease. "Range appears to be a couple of million kilometers."

"They weren't there a minute ago, either," Melissa said. "I hollered when they showed up."

As Frederica fiddled with the radar and the computer, Herzog stayed on the exercise bike, feeling singularly useless: what good is a geologist millions of kilometers away from rocks? He wouldn't even get his name in the history books —no one remembers the crew of the third expedition to anywhere.

Frederica finished her checks. "I can't find anything wrong," she said, sounding angry at herself and the equipment both.

"Time to get on the horn to Earth, Freddie," Art Snyder said. "If I'm going to land this beast, I can't have the radar telling me lies."

Melissa was already talking into the microphone. "Houston, this is *Ares III*. We have a problem—"

Even at light-speed, there were a good many minutes of waiting. They crawled past, one by one. Everyone jumped when the speaker crackled to life. "*Ares III*, this is Houston Control. Ladies and gentlemen, I don't quite know how to tell you this, but we see them too."

The communicator kept talking, but no one was listening to her anymore. Herzog felt his scalp tingle as his hair, in primitive reflex, tried to stand on end. Awe filled him. He had never thought he would live to see humanity contact another race. "Call them, Mel," he said urgently.

She hesitated. "I don't know, Buck. Maybe we should let Houston handle this."

"Screw Houston," he said, surprised at his own vehemence. "By the time the bureaucrats down there figure out what to do, we'll be coming down on Mars. We're the people on the spot. Are you going to throw away the most important moment in the history of the species?"

Melissa looked from one of her crewmates to the next. Whatever she saw in their faces must have satisfied her, for she shifted the aim to the antenna and began to speak: "This is the spacecraft *Ares III*, calling the unknown ships. Welcome from the people of Earth." She turned off the transmitter for a moment. "How many languages do we have?"

The call went out in Russian, Mandarin, Japanese, French, German, Spanish, even Latin. ("Who knows the last time they may have visited?" Frederica said when Snyder gave her an odd look.)

If the wait for a reply from Earth had been long, this one was infinitely worse. The delay stretched far, far past the fifteen-second speed-of-light round trip. "Even if they don't speak any of our languages, shouldn't they say *something*?" Melissa demanded of the air. It did not answer, nor did the aliens.

Then, one at a time, the strange ships began darting away sunward, toward

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Earth. "My God, the acceleration!" Snyder said. "Those are no rockets!" He looked suddenly sheepish. "I don't suppose starships would have rockets, would they?"

The *Ares III* lay alone again in its part of space, pursuing its Hohmann orbit inexorably toward Mars. Buck Herzog wanted to cry.

As was their practice, the ships of the Roxolan fleet gathered above the pole of the new planet's hemisphere with the most land. Because everyone would be coming to the same spot, the doctrine made visual rendezvous easy. Soon only four ships were unaccounted for. A scoutship hurried around to the other pole, found them, and brought them back.

"Always some water-lovers every trip," Togram chuckled to the steerers as he brought them the news. He took every opportunity he could to go to their dome, not just for the sunlight but also because, unlike many soldiers, he was interested in planets for their own sake. With any head for figures, he might have tried to become a steerer himself.

He had a decent hand with quill and paper, so Ransisc and Olgren were willing to let him spell them at the spyglass and add to the sketchmaps they were making of the world below.

"Funny sort of planet," he remarked. "I've never seen one with so many forest fires or volcanoes or whatever they are on the dark side."

"I still think they're cities," Olgren said, with a defiant glance at Ransisc.

"They're too big and too bright," the senior steerer said patiently; the argument, plainly, had been going on for some time.

"This is your first trip off-planet, isn't it, Olgren?" Togram asked.

"Well, what if it is?"

"Only that you don't have enough perspective. Egelloc on Roxolan has almost a million people, and from space it's next to invisible at night. It's nowhere near as bright as those lights, either. Remember, this is a primitive planet. I admit it looks like there's intelligent life down there, but how could a race that hasn't even stumbled across the hyperdrive build cities ten times as great as Egelloc?"

"I don't know," Olgren said sulkily. "But from what little I can see by moonlight, those lights look to be in good spots for cities—on coasts, or along rivers, or whatever."

Ransisc sighed. "What are we going to do with him, Togram? He's so sure he knows everything, he won't listen to reason. Were you like that when you were young?"

"Till my clanfathers beat it out of me, anyway. No need getting all excited, though. Soon enough the flyers will go down with their *luofi*, and then we'll know." He swallowed a snort of laughter, then sobered abruptly, hoping he hadn't been as gullible as Olgren when he was young.

"I have one of the alien vessels on radar," the SR-81 pilot reported. "It's down to 80,000 meters and still descending." He was at his own plane's operational ceiling, barely half as high as the ship entering atmosphere.

"For God's sake, hold your fire," ground control ordered. The command

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

had been dinned into him before he took off, but the brass were not about to let him forget. He did not really blame them. One trigger-happy idiot could ruin humanity forever.

"I'm beginning to get a visual image," he said, glancing at the head-up display projected in front of him. A moment later he added, "It's one damn funny-looking ship, I can tell you that already. Where are the wings?"

"We're picking up the image now too," the ground control officer said. "They must use the same principle for their in-atmosphere machines as they do for their spacecraft: some sort of antigravity that gives them both lift and drive capability."

The alien ship kept ignoring the SR-81, just as all the aliens had ignored every terrestrial signal beamed at them. The craft continued its slow descent, while the SR-81 pilot circled below, hoping he would not have to go down to the aerial tanker to refuel.

"One question answered," he called to the ground. "It's a warplane." No craft whose purpose was peaceful would have had those glaring eyes and that snarling, fang-filled mouth painted on its belly. Some USAF ground-attack aircraft carried similar markings.

At last the alien reached the level at which the SR-81 was loitering. The pilot called the ground again. "Permission to pass in front of the aircraft?" he asked. "Maybe everybody's asleep in there and I can wake 'em up."

After a long silence, ground control gave grudging ascent. "No hostile gestures," the controller warned.

"What do you think I'm going to do, flip him the finger?" the pilot muttered, but his radio was off. Acceleration pushed him back in his seat as he guided the SR-81 into a long, slow turn that would carry it about half a kilometer in front of the vessel from the spacefleet.

His airplane's camera gave him a brief glimpse of the alien pilot, who was sitting behind a small, dirty windscreen.

The being from the stars saw him, too. Of that there was no doubt. The alien jinked like a startled fawn, performing maneuvers that would have smeared the SR-81 pilot against the walls of his pressure cabin—if his aircraft could have matched them in the first place.

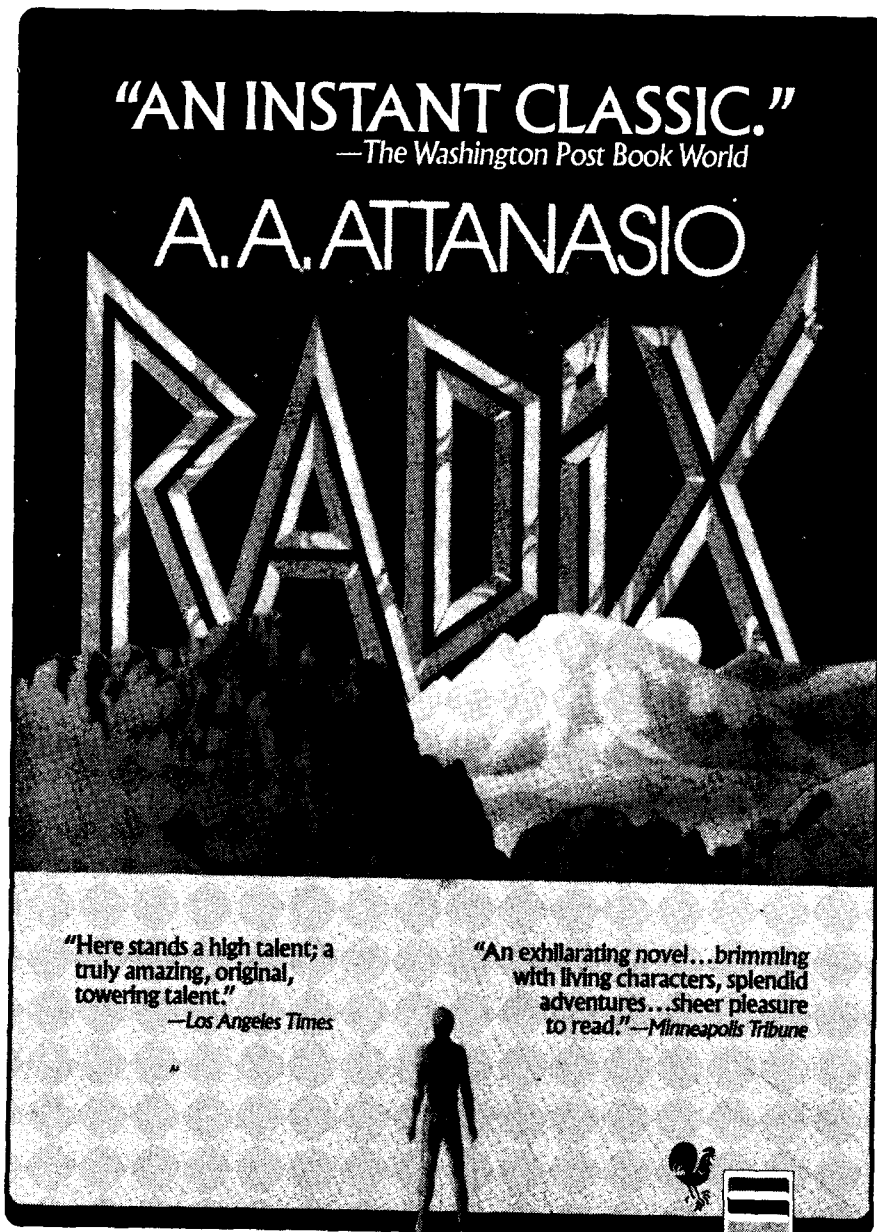
"I'm giving pursuit!" he shouted. Ground control screamed at him, but he was the man on the spot. The surge from his afterburner made the pressure he had felt before a love pat by comparison.

Better streamlining made his plane faster than the craft from the starships, but that did not do him much good. Every time its pilot caught sight of him, the alien ship danced away with effortless ease. The SR-81 pilot felt like a man trying to kill a butterfly with a hatchet.

To add to his frustration, his fuel warning light came on. In any case, his aircraft was designed for the thin atmosphere at the edge of space, not the increasingly denser air through which the alien flew. He swore, but he had to pull away.

As his SR-81 gulped kerosene from the tanker, he could not help wondering what would have happened if he'd turned a missile loose. There were a couple of times he'd had a perfect shot. That was one thought he kept firmly to himself. What his superiors would do

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED


"AN INSTANT CLASSIC."
—The Washington Post Book World
A. A. ATTANASIO
RADIX
"Here stands a high talent; a truly amazing, original, towering talent."
—Los Angeles Times
"An exhilarating novel...brimming with living characters, splendid adventures...sheer pleasure to read."—Minneapolis Tribune
A BANTAM SPECTRA BOOK

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

if they knew about it was too gruesome to contemplate.

The troopers crowded round Togram as he came back from the officers' conclave. "What's the word, captain?" "Did the *luof* live?" "What's it like down there?"

"The *luof* lived, boys!" Togram said with a broad smile.

His company raised a cheer that echoed deafeningly in the barracks room. "We're going down!" they whooped. Ears stood high in excitement. Some soldiers waved plumed hats in the fetid air. Others, of a bent more like their captain's, went over to their pallets and began seeing to their weapons.

"How tough are they going to be, sir?" a gray-furred veteran named Ilingua asked as Togram went by. "I hear the flier pilot saw some funny things."

Togram's smile got wider. "By the heavens and hells, Ilingua, haven't you done this often enough to know better than pay heed to rumors you hear before planetfall?"

"I hope so, sir," Ilingua said, "but these are so strange I thought there might be something to them." When Togram did not answer, the trooper shook his head at his own foolishness and shook up a lantern so he could examine his dagger's edge.

As inconspicuously as he could, the captain let out a sigh. He did not know what to believe himself, and he had listened to the pilot's report. How could the locals have flying machines when they did not know contragravity? Togram had heard of a race that used hot-air balloons before it discovered the better way of doing things, but no balloon could have reached the altitude the locals' flier had achieved, and no balloon could have changed direction, as the pilot had violently insisted this craft had done.

Assume he was wrong, as he had to be. But how was one to take his account of towns as big as the ones whose possibility Ransisc had ridiculed, of a world so populous there was precious little open space? And lantern signals from other ships showed their scout pilots were reporting the same wild improbabilities.

Well, in the long run it would not matter if this race was numerous as *reffo* at a picnic. There would simply be that many more subjects here for Roxolan.

"This is a terrible waste," Billy Cox said to anyone who would listen as he slung his duffelbag over his shoulder and tramped out to the waiting truck. "We should be meeting the starpeople with open arms, not with a show of force."

"You tell 'em, Professor," Sergeant Santos Amoros chuckled from behind him. "Me, I'd sooner stay on my butt in a nice, air-conditioned barracks than face L.A. summer smog and sun any old day. Damn shame you're just a Spec-1. If you was President, you could give the orders any way you wanted, instead o' takin' 'em."

Cox didn't think that was very fair either. He'd been just a few units short of his M.A. in poli sci when the big buildup after the second Syrian crisis sucked him into the army.

He had to fold his lanky length like a jackknife to get under the olive-drab canopy of the truck and down into the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

passenger compartment. The seats were too hard and too close together. Jamming people into the vehicle counted for more than their comfort while they were there. Typical military thinking, Cox thought disparagingly.

The truck filled. The big diesel rumbled to life. A black soldier dug out a deck of cards and bet anyone that he could turn twenty-five cards into five pat poker hands. A couple of greenhorns took him up on it. Cox had found out the expensive way that it was a sucker bet. The black man was grinning as he offered the deck to one of his marks to shuffle.

Riffff! The ripple of the pasteboards was authoritative enough to make everybody in the truck turn his head. "Where'd you learn to handle cards like that, man?" demanded the black soldier, whose name was Jim but whom everyone called Junior.

"Dealing blackjack in Vegas." *Riffff!*

"Hey, Junior," Cox called, "all of a sudden I want ten bucks of your action."

"Up yours too, pal," Junior said, glumly watching the cards move as if they had lives of their own.

The truck rolled northward, part of a convoy of trucks, MICV's, and light tanks that stretched for miles. An entire regiment was heading into Los Angeles, to be billeted by companies in different parts of the sprawling city. Cox approved of that; it made it less likely that he would personally come face-to-face with any of the aliens.

"Sandy," he said to Amoros, who was squeezed in next to him, "even if I'm wrong and the aliens aren't friendly, what the hell good will hand weapons do? It'd be like taking on an elephant with a safety pin."

"Professor, like I told you already, they don't pay me to think, or you neither. Just as well, too. I'm gonna do what the lieutenant tells me, and you're gonna do what I tell you, and everything is gonna be fine, right?"

"Sure," Cox said, because Sandy, while he wasn't a bad guy, was a sergeant. All the same, the Neo-Armalite between Cox's boots seemed very futile, and his helmet and body armor as thin and gauzy as a stripper's negligee.

The sky outside the steerers' dome began to go from black to deep blue as the *Indomitable* entered atmosphere. "There," Olgren said, pointing. "That's where we'll land."

"Can't see much from this height," Togram remarked.

"Let him use your spyglass, Olgren," Ransisc said. "He'll be going back to his company soon."

Togram grunted; that was more than a comment—it was also a hint. Even so, he was happy to peer through the eyepiece. The ground seemed to leap toward him. There was a moment of disorientation as he adjusted to the inverted image, which put the ocean on the wrong side of the field of view. But he was not interested in sightseeing. He wanted to learn what his soldiers and the rest of the troops aboard the *Indomitable* would have to do to carve out a beachhead and hold it against the locals.

"There's a spot that looks promising," he said. "The greenery there in the midst of the buildings in the eastern—no, the western—part of the city. That should give us a clear landing

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

zone, a good campground, and a base for landing reinforcements."

"Let's see what you're talking about," Ransisc said, elbowing him aside. "Hmm, yes, I see the stretch you mean. That might not be bad. Olgren, come look at this. Can you find it again in the Warmaster's spyglass? All right then, go point it out to him. Suggest it as our setdown point."

The apprentice hurried away. Ransisc bent over the eyepiece again. "Hmm," he repeated. "They build tall down there, don't they?"

"I thought so," Togram said. "And there's a lot of traffic on those roads. They've spent a fortune cobblestoning *them all, too; I didn't see any dust* kicked up."

"This should be a rich conquest," Ransisc said.

Something swift, metallic, and predator-lean flashed past the observation window. "By the gods, they do have fliers, don't they?" Togram said. In spite of the pilots' claims, deep down he hadn't believed it until he saw it for himself.

He noticed Ransisc's ears twitching impatiently, and realized he really had spent too much time in the observation room. He picked up his glowmite lantern and went back to his troopers.

A couple of them gave him a resentful look for being away so long, but he cheered them up by passing on as much as he could about their landing site. Common soldiers loved nothing better than inside information. They second-guessed their superiors without it, but the game was even more fun when they had some idea of what they were talking about.

A runner appeared in the doorway. "Captain Togram, your company will planet from airlock three."

"Three," Togram acknowledged, and the runner trotted off to pass orders to other ground troop leaders. The captain put his plumed hat on his head (the plume was scarlet, so his company could recognize him in combat), checked his pistols one last time, and ordered his troopers to follow him.

The reeking darkness was as oppressive in front of the inner airlock door as anywhere else aboard the *Indomitable*, but somehow easier to bear. Soon the doors would swing open and he would feel fresh breezes riffling his fur, taste sweet clean air, enjoy sunlight for more than a few precious units at a stretch. Soon he would measure himself against these new beings in combat.

He felt the slightest of jolts as the *Indomitable*'s fliers launched themselves from the mother ship. There would be no *luofi* aboard them this time, but musketeers to terrorize the natives with fire from above, and jars of gunpowder to be touched off and dropped. The Roxolani always strove to make as savage a first impression as they could. Terror doubled their effective numbers.

Another jolt came, different from the one before. They were down.

A shadow spread across the UCLA campus. Craning his neck, Junior said, "Will you look at the size of the mother!" He had been saying that for the last five minutes, as the starship slowly descended.

Each time, Billy Cox could only nod, his mouth dry, his hands clutching the plastic grip and cool metal barrel of his

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

What happens when a professor of medieval literature gets soused and conjures up a shapely demon right in the middle of a faculty party?

A PERSONAL DEMON

By DAVID BISCHOFF, RICH BROWN, and LINDA RICHARDSON

Well, if the professor is Willis Baxter and the demon is a four-thousand-year-old lush and lovely "young" lady named Anathae, with none too ladylike a sense of humor—the result is bound to be wild.

Did she really turn the state governor into a big fat pig? And could that be the Devil himself, in full fury, there in the living room? Follow the magical antics of Willis Baxter and the demon he learns to love, in the year's most enchanting and extravagant fantasy romp.
$2.95

SIGNET FANTASY

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

rifle. The Neo-Armalite seemed totally impotent against the huge bulk floating so arrogantly downward. The alien flying machines around it were as minnows beside a whale, while they in turn dwarfed the USAF planes circling at a greater distance. The roar of their jets assailed the ears of the nervous troops and civilians on the ground. The aliens' engines were eerily silent.

The starship landed in the open quad between New Royce, New Haines, New Kinsey, and New Powell Halls. It towered higher than any of the two-story red brick buildings, each a reconstruction of one overthrown in the earthquake of 2034. Cox heard saplings splinter under the weight of the alien craft. He wondered what it would have done to the big trees that had fallen five years ago along with the famous old halls.

"All right, they've landed. Let's move on up," Lieutenant Shotton ordered. He could not quite keep the wobble out of his voice, but he trotted south toward the starship. His platoon followed him past Dickson Art Center, past New Bunche Hall. Not so long ago, Billy Cox had walked this campus barefoot. Now his boots thudded on concrete.

The platoon deployed in front of Dodd Hall, looking west toward the spacecraft. A little breeze toyed with the leaves of the young, hopeful trees planted to replace the stalwarts lost to the quake.

"Take as much cover as you can," Lieutenant Shotton ordered quietly. The platoon scrambled into flowerbeds, snuggled down behind thin treetrunks. Out on Hilgard Avenue, diesels roared as armored fighting vehicles took positions with good lines of fire.

It was all such a waste, Cox thought bitterly. The thing to do was to make friends with the aliens, not to assume automatically they were dangerous.

Something, at least, was being done along those lines. A delegation came out of Murphy Hall and slowly walked behind a white flag from the administration building toward the starship. At the head of the delegation was the mayor of Los Angeles: the President and governor were busy elsewhere. Billy Cox would have given anything to be part of the delegation instead of sprawled here on his belly in the grass. If only the aliens had waited until he was fifty or so, had given him a chance to get established—

Sergeant Amoros nudged him with an elbow. "Look there, man. Something's happening—"

Amoros was right. Several hatchways which had been shut were swinging open, allowing Earth's air to mingle with the ship's.

The westerly breeze picked up. Cox's nose twitched. He could not name all the exotic odors wafting his way, but he recognized sewage and garbage when he smelled them. "God, what a stink!" he said.

"By the gods, what a stink!" Togram exclaimed. When the outer airlock doors went down, he had expected real fresh air to replace the stale, overused gases inside the *Indomitable*. This stuff smelled like smoky peat fires, or lamps whose wicks hadn't quite been extinguished. And it stung! He felt the nictitating membranes flick across his eyes to protect them.

"Deploy!" he ordered, leading his

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

company forward. This was the tricky part. If the locals had nerve enough, they could hit the Roxolani just as the latter were coming out of their ship, and cause all sorts of trouble. Most races without hyperdrive, though, were too overawed by the arrival of travelers from the stars to try anything like that. And if they didn't do it fast, it would be too late.

They weren't doing it here. Togram saw a few locals, but they were keeping a respectful distance. He wasn't sure how many there were. Their mottled skins—or was that clothing?—made them hard to notice and count. But they were plainly warriors, both by the way they acted and by the weapons they bore.

His own company went into its familiar two-line formation, the first crouching, the second standing and aiming their muskets over the heads of the troops in front.

"Ah, there we go," Togram said happily. The bunch approaching behind the white banner had to be the local nobles. The mottling, the captain saw, was clothing, for these beings wore entirely different garments, somber except for strange, narrow neckcloths. They were taller and skinnier than Roxolani, with muzzleless faces.

"Ilingua!" Togram called. The veteran trooper led the right flank squad of the company.

"Sir!"

"Your troops, quarter-right face. At the command, pick off the leaders there. That will demoralize the rest," Togram said, quoting standard doctrine.

"Slowmatches ready!" Togram said. The Roxolani lowered the smoldering cords to the toucholes of their muskets. "Take your aim!" The guns moved, very slightly. "Fire!"

"Teddy bears!" Sandy Amoros exclaimed. The same thought had leaped into Cox's mind. The beings emerging from the spaceship were round, brown, and furry, with long noses and big ears. Teddy bears, however, did not normally carry weapons. They also, Cox thought, did not commonly live in a place that smelled like sewage. Of course it might have been perfume to them. But if it was, they and Earthpeople were going to have trouble getting along.

He watched the Teddy bears as they took their positions. Somehow their positioning did not suggest that they were forming an honor guard for the mayor and his party. Yet it did look familiar to Cox, although he could not quite figure out why.

Then he had it. If he had been anywhere but at UCLA, he would not have made the connection. But he remembered a course he had taken on the rise of the European nation-states in the sixteenth century, and on the importance of the professional, disciplined armies the kings had created. Those early armies had performed evolutions like this one.

It was a funny coincidence. He was about to mention it to his sergeant when the world blew up.

Flames spurted from the aliens' guns. Great gouts of smoke puffed into the sky. Something that sounded like an angry wasp buzzed past Cox's ear. He heard shouts and shrieks from either side. Most of the mayor's delegation

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

was down, some motionless, others thrashing.

There was a crash from the starship, and another one an instant later as a roundshout smashed into the brickwork of Dodd Hall. A chip stung Cox in the back of the neck. The breeze brought him the smell of fireworks, one he had not smelled for years.

"Reload!" Togram yelled. "Another volley, then at 'em with the bayonet!" His troopers worked frantically, measuring powder charges and ramming round bullets home.

"So that's how they wanna play!" Amoros shouted. "Nail their hides to the wall!" The tip of his little finger had been shot away. He did not seem to know it.

Cox's Neo-Armalite was already barking, spitting a stream of hot brass cartridges, slamming against his shoulder. He rammed in clip after clip, playing the rifle like a hose. If one bullet didn't bite, the next would.

Others from the platoon were also firing. Cox heard bursts of automatic weapons fire from different parts of the campus, too, and the deeper blasts of rocket-propelled grenades and field artillery. Smoke not of the aliens' making began to envelop their ship and the soldiers around it.

One or two shots came back at the platoon, and then a few more, but so few that Cox, in stunned disbelief, shouted to his sergeant, "This isn't fair!"

"Fuck 'em!" Amoros shouted back. "They wanna throw their weight around, they take their chances. Only good thing they did was knock over the mayor. Always did hate that old crackpot."

The harsh *tac-tac-tac* did not sound like any gunfire Togram had heard. The shots came too close together, making a horrible sheet of noise. And if the locals were shooting back at his troopers, where were the thick, choking clouds of gunpowder smoke over their position?

He did not know the answer to that. What he did know was that his company was going down like grain before a scythe. Here a soldier was hit by three bullets at once and fell awkwardly, as if his body could not tell in which direction to twist. There another had the top of his head gruesomely removed.

The volley the captain had screamed for was stillborn. Perhaps a squad's worth of soldiers moved toward the locals, the sun glinting bravely off their long, polished bayonets. None of them got more than a half-sixteen of paces before falling.

Ilingua looked at Togram, horror in his eyes, his ears flat against his head. The captain knew his were the same. "What are they doing to us?" Ilingua howled.

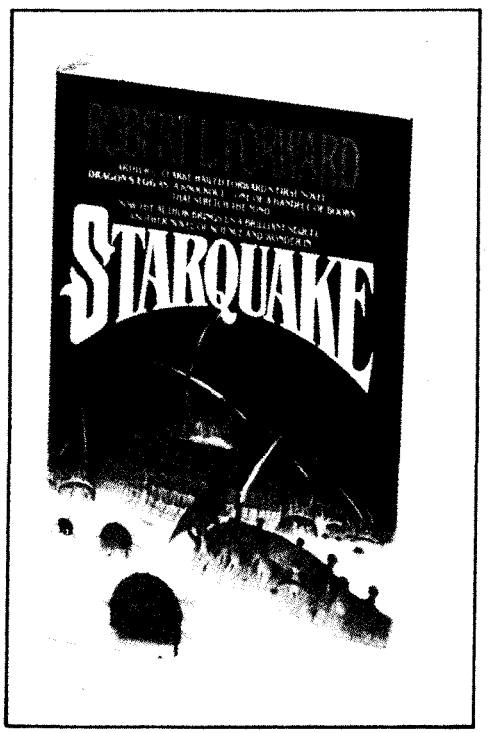
Togram could only shake his head helplessly. He dove behind a corpse, fired one of his pistols at the enemy. There was still a chance, he thought —how would these demonic aliens stand up under their first air attack?

A flier swooped toward the locals. Musketeers blasted away from firing ports, drew back to reload.

"Take that, you whoresons!" Togram shouted. He did not, however,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

A triumphant new novel of science fiction, fact...and wonder!



The humans were about to leave the neutron star Dragon's Egg. There, turns ago, they had discovered the thriving native race of cheela who lived—and learned—a million times faster than Man.

But suddenly a monstrous starquake destroyed all but a few cheela on the surface and a group in orbit around the star. It left the humans a dreadful choice: they could shrug their shoulders, return to Earth, and let a friendly race face extinction; or remain to render assistance...and probably die!

STARQUAKE
by Robert L. Forward
author of *Dragon's Egg*

#1 in Science Fiction and Fantasy
Published by Ballantine Books

A
Del Rey
Hardcover

DEL REY

On sale in
October
$14.95

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

raise his fist in the air. That, he had already learned, was dangerous.

"Incoming aircraft!" Sergeant Amoros roared. His squad, those not already prone, flung themselves on their faces. Cox heard shouts of pain through the combat din as men were wounded.

The Cottonmouth crew launched their shoulder-fired AA missile at the alien flying machine. The pilot must have had reflexes like a cat's. He sidestepped his machine in midair; no plane built on Earth could have matched that performance. The Cottonmouth shot harmlessly past.

The flier dropped what looked like a load of crockery. The ground jumped as the bombs exploded. Cursing, deafened, Billy Cox stopped worrying whether the fight was fair.

But the flier pilot had not seen the F-29 fighter on his tail. The USAF plane released two missiles from point-blank range, less than a mile. The infrared-seeker found no target and blew itself up, but the missile that homed on radar streaked straight toward the flier. The explosion made Cox bury his face in the ground and clap his hands over his ears.

So this is war, he thought: I can't see, I can barely hear, and my side is winning. What must it be like for the losers?

Hope died in Togram's hearts when the first flier fell victim to the locals' aircraft. The rest of the *Indomitable*'s machines did not last much longer. They could evade, but had even less ability to hit back than the Roxolan ground forces. And they were hideously vulnerable when attacked in their pilots' blind spots, from below or behind.

One of the starship's cannon managed to fire again, and quickly drew a response from the traveling fortresses Togram got glimpses of as they took their positions in the streets outside this park-like area.

When the first shell struck, the luckless captain thought for an instant that it was another gun going off aboard the *Indomitable*. The sound of the explosion was nothing like the crash a solid shot made when it smacked into a target. A fragment of hot metal buried itself in the ground by Togram's hand. That made him think a cannon had blown up, but more explosions on the ship's superstructure and fountains of dirt flying up from misses showed it was just more from the locals' fiendish arsenal.

Something large and hard struck the captain in the back of the neck. The world spiraled down into blackness.

"Cease fire!" The order reached the field artillery first, then the infantry units at the very front line. Billy Cox pushed up his cuff to look at his watch, stared in disbelief. The whole firefight had lasted less than twenty minutes.

He looked around. Lieutenant Shotton was getting up from behind an ornamental palm. "Let's see what we have," he said. His rifle still at the ready, he began to walk slowly toward the starship. It was hardly more than a smoking ruin. For that matter, neither were the buildings around it. The damage to their predecessors had been worse in the big quake, but not much.

Alien corpses littered the lawn. The blood splashing the bright green grass was crimson as any man's. Cox bent to pick up a pistol. The weapon was beau-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tifully made, with scenes of combat carved into the grayish wood of the stock. But he recognized it as a single-shot piece, a smallarm obsolete for at least two centuries. He shook his head in wonderment.

Sergeant Amoros lifted a conical object from where it had fallen beside a dead alien. "What the hell is this?" he demanded.

Again Cox had the feeling of being caught up in something he did not understand. "It's a powderhorn," he said.

"Like in the movies? Pioneers and all that good shit?"

"The very same."

"Damn," Amoros said feelingly. Cox nodded in agreement.

Along with the rest of the platoon, they moved closer to the wrecked ship. Most of the aliens had died still in the two neat rows from which they had opened fire on the soldiers.

Here, behind another corpse, lay the body of the scarlet-plumed officer who had given the order to begin that horrifyingly uneven encounter. Then, startling Cox, the alien moaned and stirred, just as might a human starting to come to. "Grab him; he's a live one!" Cox exclaimed.

Several men jumped on the reviving alien, who was too groggy to fight back. Soldiers began peering into the holes torn in the starship, and even going inside. There they were still wary; the ship was so incredibly much bigger than any human spacecraft that there were surely survivors despite the shellacking it had taken.

As always happens, the men did not get to enjoy such pleasures long. The fighting had been over for only minutes when the first team of experts came thuttering in by helicopter, saw common soldiers in their private preserve, and made horrified noises. The experts also promptly relieved the platoon of its prisoner.

Sergeant Amoros watched resentfully as they took the alien away. "You must've known it would happen, Sandy," Cox consoled him. "We do the dirty work and the brass takes over once things get cleaned up again."

"Yeah, but wouldn't it be wonderful if just once it was the other way round?" Amoros laughed without humor. "You don't need to tell me: fat friggin' chance."

When Togram woke up on his back, he knew something was wrong. Roxolani always slept prone. For a moment he wondered how he had got to where he was . . . too much water-of-life the night before? His pounding head made that a good possibility.

Then memory came flooding back. Those damnable locals with their sorcerous weapons! Had his people rallied and beaten back the enemy after all? He vowed to light votive lamps to Edieva, mistress of battles, for the rest of his life if that were true.

The room he was in began to register. Nothing was familiar, from the bed he lay on to the light in the ceiling that glowed bright as sunshine and neither smoked nor flickered. No, he did not think the Roxolani had won their fight.

Fear settled like ice in his vitals. He knew how his own race treated prisoners, had heard spacers' stories of even worse things among other folk. He shuddered to think of the refined tortures

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a race as ferocious as his captors could invent.

He got shakily to his feet. By the end of the bed he found his hat, some smoked meat obviously taken from the *Indomitable*, and a translucent jug made of something that was neither leather nor glass nor baked clay nor metal. Whatever it was, it was too soft and flexible to make a weapon.

The jar had water in it: *not* water from the *Indomitable*. That was already beginning to taste stale. This was cool and fresh and so pure as to have no taste whatever, water so fine he had only found its like in a couple of mountain springs.

The door opened on noiseless hinges. In came two of the locals. One was small and wore a white coat—a female, if those chest projections were breasts. The other was dressed in the same clothes the local warriors had worn, though those offered no camouflage here. That one carried what was plainly a rifle and, the gods curse him, looked extremely alert.

To Togram's surprise, the female took charge. The other local was merely a bodyguard. Some spoiled princess, curious about these outsiders, the captain thought. Well, he was happier about treating with her than meeting the local executioner.

She sat down, waved for him also to take a seat. He tried a chair, found it uncomfortable—too low in the back, not built for his wide rump and short legs. He sat on the floor instead.

She set a small box on the table by the chair. Togram pointed at it. "What's that?" he asked.

He thought she had not understood —no blame to her for that; she had none of his language. She was playing with the box, pushing a button here, a button there. Then his ears went back and his hackles rose, for the box said, "What's that?" in Roxolani. After a moment he realized it was speaking in his own voice. He swore and made a sign against witchcraft.

She said something, fooled with the box again. This time it echoed her. She pointed at it. " 'Recorder,' " she said. She paused expectantly.

What was she waiting for, the Roxolanic name for that thing? "I've never seen one of those in my life, and I hope I never do again," he said. She scratched her head. When she made the gadget again repeat what he had said, only the thought of the soldier with the gun kept him from flinging it against the wall.

Despite that contretemps, they did eventually make progress on the language. Togram had picked up snatches of a good many tongues in the course of his adventurous life; that was one reason he had made captain in spite of low birth and paltry connections. And the female—Togram heard her name as Hildachesta—had a gift for them, as well as the box that never forgot.

"Why did your people attack us?" she asked one day, when she had come far enough in Roxolanic to be able to frame the question.

He knew he was being interrogated, no matter how polite she sounded. He had played that game with prisoners himself. His ears twitched in a shrug. He had always believed in giving straight answers; that was one reason he was only a captain. He said, "To take what you grow and make and use it for our-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

From the bestselling author of
The Code of the Lifemaker–
the year's most intriguing thriller:

THE PROTEUS OPERATION

A NOVEL BY

JAMES P. HOGAN

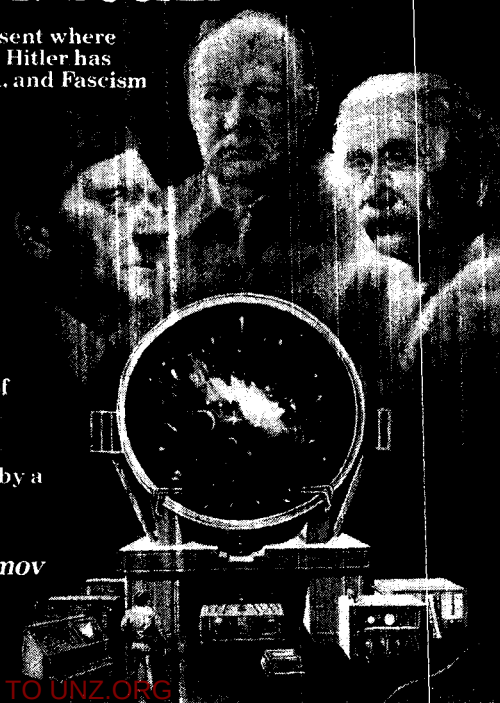
THE TIME: The present—but a present where history has taken a strange course. Hitler has emerged victorious in World War II, and Fascism dominates the globe.

THE PLACE: America—the last bastion of democracy on earth.

THE MISSION: Operation Proteus—a daring mission to travel back in time to 1939 and change the outcome of history.

Blending an intriguing "what-if" premise worthy of Len Deighton's SS GB, a gripping tale of wartime adventure, and a moving portrait of a team of brave men and women fighting to save a world they may never live to see, THE PROTEUS OPERATION is a major new work by a brilliantly imaginative writer.

"Arthur Clarke, move over!"
–Isaac Asimov



A BANTAM SPECTRA HARDCOVER

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

selves. Why would anyone want to conquer anyone else?"

"Why indeed?" she murmured, and was silent a little while; his forthright reply seemed to have closed off a line of questioning. She tried again: "How are your people able to walk—I mean, travel—faster than light, when the rest of your arts are so simple?"

His fur bristled with indignation. "They are not! We make gunpowder, we cast iron and smelt steel, we have spyglasses to help our steerers guide us from star to star. We are no savages huddling in caves or shooting at each other with bows and arrows."

His speech, of course, was not that neat or simple. He had to backtrack, to use elaborate circumlocutions, to play-act to make Hildachesta understand. She scratched her head in the gesture of puzzlement he had come to recognize. She said, "We have known all these things you mention for hundreds of years, but we did not think anyone could walk —damn, I keep saying that instead of 'travel'—faster than light. How did your people learn to do that?"

"We discovered it for ourselves," he said proudly. "We did not have to learn it from some other starfaring race, as many folk do."

"But *how* did you discover it?" she persisted.

"How do I know? I'm a soldier; what do I care for such things? Who knows who invented gunpowder or found out about using bellows in a smithy to get the fire hot enough to melt iron? These things happen, that's all."

She broke off the questions early that day.

"It's humiliating," Hilda Chester said. "If these fool aliens had waited a few more years before they came, we likely would have blown ourselves to kingdom come without ever knowing there was more real estate around. Christ, from what the Roxolani say, races that scarcely know how to work iron fly starships and never think twice about it."

"Except when the starships don't get home," Charlie Ebbets answered. His tie was in his pocket and his collar open against Pasadena's fierce summer heat, although the Caltech Atheneum was efficiently air-conditioned. Along with so many other engineers and scientists, he depended on linguists like Hilda Chester for a link to the aliens.

"I don't quite understand it myself," she said. "Apart from the hyperdrive and contragravity, the Roxolani are backward, almost primitive. And the other species out there must be the same, or someone would have overrun them long since."

Ebbets said, "Once you see it, the drive is amazingly simple. The research crews say anybody could have stumbled over the principle at almost any time in our history. The best guess is that most races did come across it, and once they did, why, all their creative energy would naturally go into refining and improving it."

"But we missed it," Hilda said slowly, "and so our technology developed in a different way."

"That's right. That's why the Roxolani don't know anything about controlled electricity, to say nothing of atomics. And the thing is, as well as we can tell so far, the hyperdrive and contragravity don't have the ancillary applications the electromagnetic spectrum does. All they do is move things from here to there in a hurry."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"The avenging genius of popular culture"* at his scarifying best!

STEPHEN KING

NATIONAL BESTSELLER!

SKELETON CREW

*Los Angeles Times Book Review
$18.95, now at your bookstore

G.P. PUTNAM'S SONS
A Member of The Putnam Publishing Group

"That should be enough at the moment," Hilda said. Ebbets nodded. There were almost nine billion people jammed onto the Earth, half of them hungry. Now, suddenly, there were places for them to go and a means to get them there.

"I think," Ebbets said musingly, "we're going to be an awful surprise to the peoples out there."

It took Hilda a second to see what he was driving at. "If that's a joke, it's not funny. It's been a hundred years since the last war of conquest."

"Sure—they've gotten too expensive and too dangerous. But what kind of fight could the Roxolani or anyone else at their level of technology put up against us? The Aztecs and Incas were plenty brave. How much good did it do them against the Spaniards?"

"I hope we've gotten smarter in the last five hundred years," Hilda said. All the same, she left her sandwich half-eaten. She found she was not hungry anymore.

"Ransisc!" Togram exclaimed as the senior steerer limped into his cubicle. Ransisc was thinner than he had been a few moons before, aboard the misnamed *Indomitable*. His fur had grown out white around several scars Togram did not remember.

His air of amused detachment had not changed, though. "Tougher than bullets, are you, or didn't the humans think you were worth killing?"

"The latter, I suspect. With their firepower, why should they worry about one soldier more or less?" Togram said bitterly. "I didn't know you were still alive, either."

"Through no fault of my own, I assure you," Ransisc said. "Olgren, next to me—" His voice broke off. It was

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

not possible to be detached about everything.

"What are you doing here?" the captain asked. "Not that I'm not glad to see you, but you're the first Roxolan face I've set eyes on since—" It was his turn to hesitate.

"Since we landed." Togram nodded in relief at the steerer's circumlocution. Ransisc went on, "I've seen several others before you. I suspect we're being allowed to get together so the humans can listen to us talking with each other."

"How could they do that?" Togram asked, then answered his own question: "Oh, the recorders, of course." He perforce used the English word. "Well, we'll fix that."

He dropped into Oyag, the most widely spoken language on a planet the Roxolani had conquered fifty years before. "What's going to happen to us, Ransisc?"

"Back on Roxolan, they'll have realized something's gone wrong by now," the steerer answered in the same tongue.

That did nothing to cheer Togram. "There are so many ways to lose ships," he said gloomily. "And even if the High Warmaster does send another fleet after us, it won't have any more luck than we did. These gods-accursed humans have too many war-machines." He paused and took a long, moody pull at a bottle of vodka. The flavored liquors the locals brewed made him sick, but vodka he liked. "How is it they have all these machines and we don't, or any race we know of? They must be wizards, selling their souls to the demons for knowledge."

Ransisc's nose twitched in disagreement. "I asked one of their savants the same question. He gave me back a poem by a human named Hail or Snow or something of that sort. It was about someone who stood at a fork in the road and ended up taking the less-used track. That's what the humans did. Most races find the hyperdrive and go traveling. The humans never did, and so their search for knowledge went in a different direction."

"Didn't it!" Togram shuddered at the recollection of that brief, terrible combat. "Guns that spit dozens of bullets without reloading, cannon mounted on armored platforms that move by themselves, rockets that follow their targets by themselves . . . And there are the things we didn't see, the ones the humans only talk about—the bombs that can blow up a whole city, each one by itself."

"I don't know if I believe that," Ransisc said.

"I do. They sound afraid when they speak of them."

"Well, maybe. But it's not just the weapons they have. It's the machines that let them see and talk to one another from far away; the machines that do their reckoning for them; their recorders and everything that has to do with them. From what they say of their medicine, I'm almost tempted to believe you and think they are wizards—they actually know what causes their diseases, and how to cure or even prevent them. And their farming: this planet is far more crowded than any I've seen or heard of, but it grows enough for all these humans."

Togram sadly waggled his ears. "It seems so unfair. All that they got, just by not stumbling onto the hyperdrive."

"They have it now," Ransisc reminded him. "Thanks to us."

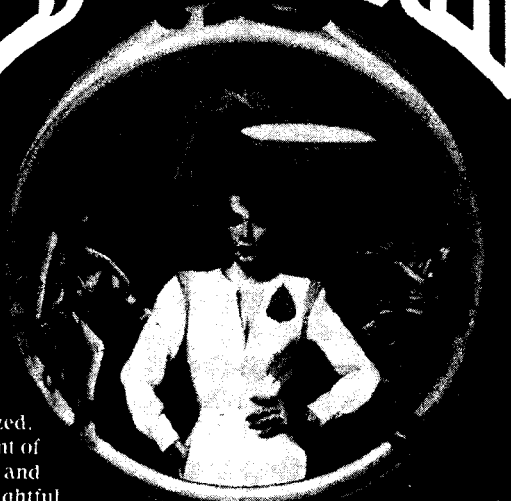
The Roxolani looked at each other, appalled. They spoke together: "What have we done?" ■

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

A Haunting Tale of Music and Immortality.

SHARON WEBB

RAM SONG



"A MOVING STORY... Webb's worlds and characters are vividly realized, and her treatment of the nature of art and the artist is thoughtful and sound." —*Fantasy Review*

A BANTAM SPECTRA BOOK

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Stephen L. Gillett, Ph.D.

THE POSTDILUVIAN WORLD

Terraforming a planet—say Venus—is, by definition, only a beginning. What really matters is how it behaves afterwards.

The deep gray clouds have gotten heavier, denser, and lower over the decades as the atmosphere has lightened and the temperature fallen. They begin to trail dark wisps and veils, rainfall not reaching the ground but evaporating in the still-hot lower atmosphere—as indeed often happens in deserts on Earth.

Finally the first drops of rainwater touch the surface. They promptly flash back into steam. But they are followed by others, popping, sizzling, finally persisting on the surface briefly before evaporating. They leave a faint rime of salts behind, material dissolved and then reprecipitated.

At last boiling water gurgles along the surface for a distance. It soaks into the regolith, only to explode in steam as it encounters the hotter material beneath, just like water poured on a hot campfire. The bursting steam scatters dirt, pocks the surface, and churns the regolith.

Later, as the surface cools still more and the first tentative drops have given way to a torrent, gigantic flash floods scour the virgin dirt. Rock debris that has never known running water is channeled and transported, only to be redeposited in deltas, bars, and alluvial fans as the slopes flatten and the water slows. Mudflows flood across the surface into the lowlands, where the water gradually begins to pool. The bottom of these deepening bodies of standing water is a seething chaos, as the water soaks deeper into the still-hot material

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

on the floor. Steam continues to rise, as from a lava flow pouring into the sea.

Salts are dissolved and carried along, to wind up in the growing ponds. The embryonic lakes and seas become brinier . . .

When the Big Rain falls on a terraformed Venus, the initial effects will be profound and spectacular. The surface of Venus has never known water action—at least, not in the last 4 billion years or so. What will happen as water starts its enormously effective erosion, and the surface evolves under its new Earthlike atmosphere? Let's see.

In an earlier article ("Second Planet-Second Earth," *Analog*, December 1984), I gave some idea about how the terraforming might be done. The exact mechanism isn't important here. I make two assumptions, however: (1) the slow rotation rate remains unchanged (it would be very difficult—i.e., expensive—to change, and can probably be lived with); and (2) to avert Venus's reverting to its present uninhabitable state through the runaway-greenhouse effect, the amount of water brought in is severely limited, and the resulting small oceans are highly salty.

To backtrack for a minute: The runaway-greenhouse effect prevents liquid water from occurring on a planetary surface above a certain critical temperature. Above this temperature, the increase in the greenhouse effect—that is, the trapping of solar energy by the atmosphere—from the additional water vapor evaporated is so great that temperatures soar. Highly salty, low-volume oceans delay the onset of the runaway-greenhouse effect, because water evaporates more sluggishly from brine. (Salty oceans should arise naturally, simply because Venus will have many such compounds in its surface already.) Having much less water than Earth also helps, because it becomes more difficult to enshroud the planet in a water-vapor blanket. The vapor tends to precipitate out in high latitudes and on the night side, fast enough to keep the greenhouse effect below the critical level. We'll assume that in this way the resulting climate can be made stable.

The effects of terraforming fall into three general timescales: (1) The short-term changes: What happens right away, even before the terraforming is complete, and during the early settlement by terrestrial life forms. (2) The mid-term changes, which will occur rapidly on a geological scale but very slowly on a human scale, say over a few thousand to a few million years. (3) The long-term geologic changes, over tens to hundreds of millions of years.

The first timescale is obviously the most important for the immediate settlement of Venus. The last, however, is probably the most important philosophically, because if a terraformed planet is to become a permanent second home for Earthly life, its new environment must persist over geologic time, not merely the few thousand years humans reckon as a "long time."

The Near Term: Nova Terra

Erosion at first will be swift. Loose dirt, never kissed by running water, will be swept up in muddy streams and car-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ried off. Arroyos will be carved; drainages established. Regolith, soaked with water for the first time, will become mud, slumping off steep slopes, nurturing a water table elsewhere. Basins will fill, to become lakes and seas. And salts, ubiquitous in the Venusian regolith, will be leached out, to end up dissolved in the growing seas. These initial changes happen on human timescales, over hours, weeks, and years.

The changes will slow down, however, as the low areas fill up with water and the loosest dirt washes away—and as the initial rain dies away. Still, lingering slope instabilities will be a hazard. Even here on Earth, for example, instabilities (that's spelled "landslides") occur occasionally, especially in geologically active areas such as places with rapid uplift, or places which were glaciated in the Ice Age and have not yet re-equilibrated with running water.

The Land

A stream flowing uncertainly down a makeshift channel, a maze of ponds, potholes, and ragged islands. A misty waterfall cascades improbably off a cliff to one side, its waters landing and vanishing into new talus at the foot of the slope. Eventually they percolate through, to gather together at the base of the debris. A hot spring gushes at another point, the fissure from which it issues already mineral-encrusted.

Farther on, the main stream splashes its way down an abrupt slope to its salty sump far below. It has already incised a shallow watercourse, and an embryonic delta is building out into the salt sea . . .

Immediately after terraforming, Venus will have a highly immature topography. "Immature" here means a topography not resulting from prolonged water erosion. What does such topography look like? Let's approach this from the other direction, by reviewing the effects of running water on the evolution of a landscape.

First of all, running water doesn't like closed depressions: lakes, ponds, any basin with no outlet. Over time, closed basins tend to be destroyed from two directions. First, they fill up with debris; flowing water carrying sediment slows down abruptly as it enters the basin, and its sediment load drops. Second, if water in the basin spills over to continue downhill, it begins to erode at the spillover point. This erosion tends to carve a canyon through the wall of the basin and thereby drain it. (Niagara Falls is eventually going to drain Lake Erie in just this way.)

Second, running water also doesn't like waterfalls, and they too are rapidly destroyed, geologically speaking. A waterfall concentrates the erosive power of the stream at one point (stand under a waterfall sometime if you're not convinced) and thus tends to destroy itself.

The net effect is that the water tries to smooth out the gradient over which it flows. No sharp breaks; no lakes, and no falls. To look at it another way, the running water tries to achieve uniform energy dissipation along its watercourse.

Of course, this evening out doesn't

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

happen right away. Some rocks are harder than others, for example; a ridge of hard rock may sustain a waterfall long after a softer rock would be worn away. Also, in some cases eroded debris is dumped into the main stream at irregular intervals by great floods coming out of tributary streams. Such debris partially dams the stream to form rapids with pools above, and only occasionally do great floods down the main stream itself flush out the accumulated debris. (The rapids on the Colorado River in the Grand Canyon are formed in this way.) Such a stream, which has a kind of chronic unevenness, is still "juvenile" —at an early stage in its history. The surrounding land has high relief and there is lots of sediment available. But if things are allowed to go to completion its gradient will also eventually become smooth.

In addition, drainage networks become interconnected or "integrated" over geologic time. Little streams become tributary to bigger streams, which in turn flow into rivers. Lots of little independent drainages are unstable. As they expand with continued erosion, they tend to connect up.

For example, one of the characteristics of the deserts in western North America—and elsewhere—is independent drainages. Washes drain mountains to end in an isolated, enclosed depression, a dry lakebed or "playa." But even in deserts these depressions are unstable, formed geologically yesterday and gone tomorrow. The isolated drainages in the southwestern US, for example, are slowly being connected by erosion working away from the drainage along the Colorado River.

We can also expect common "braided" streams on the new Venus. This is a type of streamform which develops where (1) lots of sediment is available, (2) relatively steep slopes occur, and (3) there are big variations in water flow. The "braiding" refers to a typical streambed pattern in which more-or-less parallel channels separate and rejoin, over and over in a bewildering pattern. Such channels are separated by higher areas, or "bars," which taper on both ends, and which are inundated only during maximum water flow. (The antithesis of a braided stream, in case you were wondering, is a meandering stream such as the Mississippi.)

The ephemeral streams (channels in which water flows only infrequently, after major rainstorms) in the deserts of the American West are all braided. Rivers out of steep, geologically young mountains are also typically braided; one now-spectacular example is the Toutle River draining Mt. St. Helens.

Therefore, on Venus at first there will be lots of geologically ephemeral landforms: Closed depressions, some containing lakes, and waterfalls. But as the drainages slowly become integrated, these landforms will be destroyed.

This is really not all that different from a lot of immature topography on the present Earth. Since the glaciers retreated about 10,000 years ago, running water has been diligently trying to rework the glacial landscapes left behind. (Glaciers have very different erosional

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

dynamics from liquid water.) But the abundant lakes and waterfalls in the mountains and northern part of North America, as well as the often convuluted streamcourses, show how much is still to be done.

This leads into another point: Running water does not have it all its own way. It is not the only geological agent, especially on the Earth. Other processes have dynamics of their own.

Uplift, either by slow movements of the crust itself ("tectonics") or by volcanic eruptions, raises new land to be eroded. Lava flows dam rivers and otherwise rearrange the landscape. Climatic changes cause very different processes, such as glaciation, to act at different times. In fact, between uplift and climatic change, erosion on the Earth is forever playing catchup.

As we'll see, glaciers are not likely even on a terraformed Venus. The average temperatures will just be too high. But wind erosion may be important. On Venus, there will be high temperature gradients due to the slow rotation, as I discuss below, and that means the wind will really whistle.

Hot springs will also be abundant at first. The Venus crust near the surface will be accustomed to a surface at 450°C, not one at 50°C or so. Thus, the temperature gradient under the surface will be very steep initially, and it will take a long time for the subsurface to cool simply because planets are big and rocks don't conduct heat very well. The cooling will be hastened by ground water, however. As it percolates down, the water will absorb heat and bring it back to the surface with a hot spring. Such springs will probably be mineral-rich (after all, none of the rocks involved had ever been leached by water —much less hot water—before), and they could easily be tapped for geothermal power.

The Climate

Although it is soon after dawn, the desert is already shimmering with heat reflected off the salt flat. Even so, the clouds bearing down from the east are intimidating, tan dust billowed up in a gigantic wall over which a dark squall line can occasionally be seen.

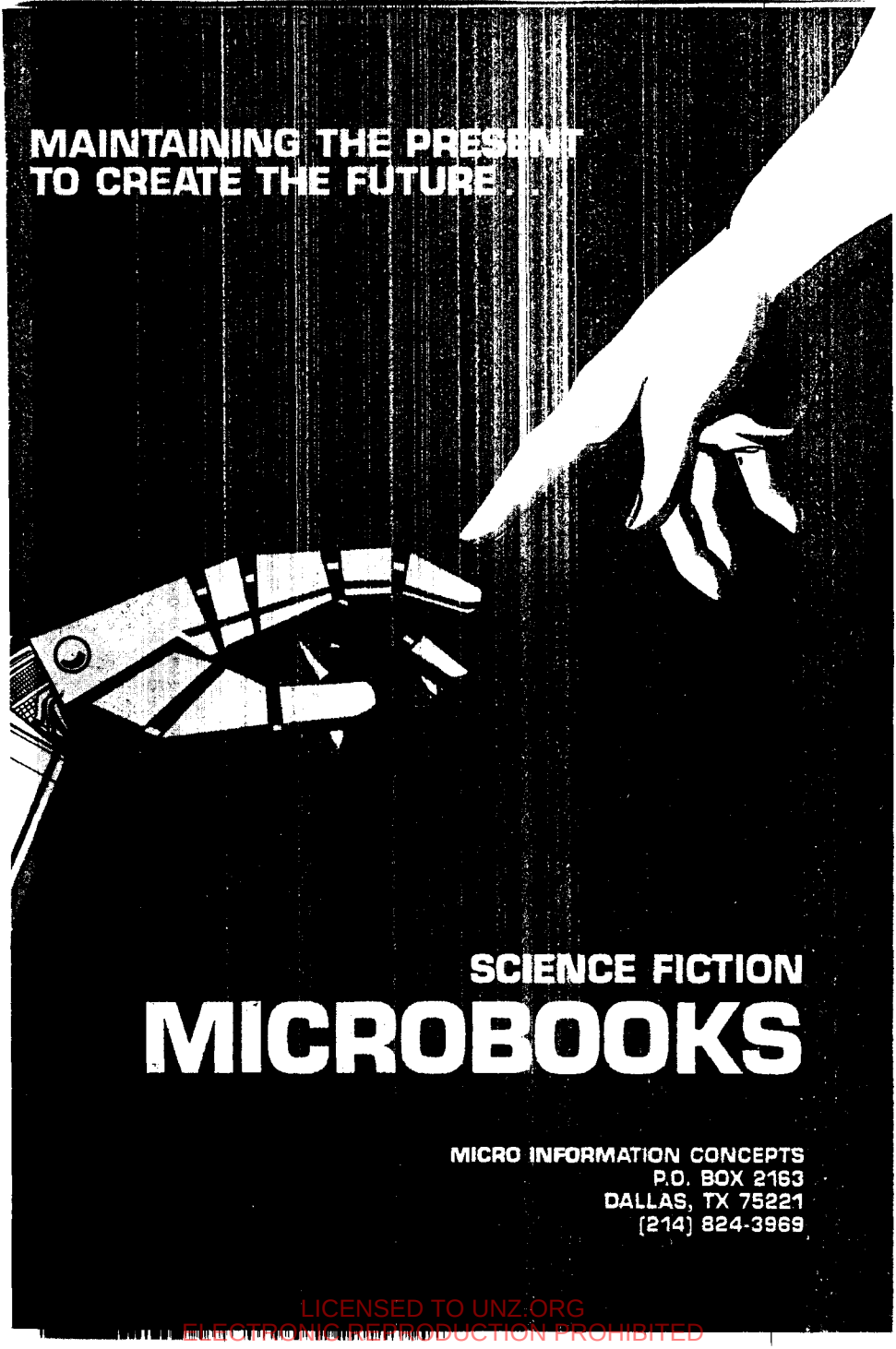
The storm strikes suddenly, wind bearing dust like Carborundum while a stinging carpet of saltating sand grains attacks at ground level. The dust storm is abruptly followed by mud, as great warm drops of rain combine with the dust in an airborne morass. As the cloudburst continues water collects, then starts across the surface in tentative rivulets. Suddenly the surface is overwhelmed with a sheetflood spreading across the salt flat and dissolving the minerals there, precipitated by the drying of the water from the last storm . . .

It's gonna be hot. *Real* hot. To estimate how hot, let's first consider a simple case, a rapidly rotating planet with no atmosphere at all. Its temperature will be given by the following equation, approximately:

$$T = \sqrt[4]{\frac{(S \cdot (1-A))}{4\sigma}}$$

where T is the temperature in degrees

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Reprinting our beloved *Astounding/Analog* in durable, storable microfiche is a great idea . . ."

Poul Anderson

"With the originals both difficult and expensive to obtain, it seems a useful collection for the scholar, collector or interested reader, in terms of price and facility of storage."

Roger Zelazny

"It's obvious how tremendous a boon M.I.C. microfiche will be to the pitiful supply of SF magazine back issues available in even the best libraries, but the real benefit here is not only to the collectors and the researchers, but to the real staple of any field: The **readers**. If any genre belongs on microfiche, it is science fiction. When the majority of cost of any book or magazine is simply to cover paper and shipping costs, it's time for a change. We read SF to find better ways. This is definitely one."

Peter D. Pautz
Executive Secretary,
Science Fiction Writers Of America, Inc.

"When I contemplate our problems with acid paper and bindings cemented with disappearing glue, I am pleased to know that my *Analog* contributions have been placed in a medium that will actually survive into the future."

Lloyd Biggle, Jr.

"I think M.I.C. has come up with an excellent idea for storing science fiction and I wholeheartedly endorse them."

Mike Resnick

"This is a great idea—and about time."

Gregory Benford

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Send for a free **science fiction microbook** today, with no obligation.

WHY?

Microbooks are published in unique high quality microfiche, written about for years as **science fiction**, now, **science fact**. M.I.C.'s ever expanding **microbook** library is science fiction at its best—produced in space age microfiche. Among the many titles available are the back issues of *Astounding/Analog* and the works of James Gunn.
Along with the free **microbook** is complete information on the space-saving, inexpensive advantages of **microbooks**, certain to increase reading enjoyment. Also included is additional information about available desk/bedside readers and projectors. Don't miss this opportunity.
Call or write today.

ASTOUNDING & analog

Published in microfiche by special arrangement with DAVIS PUBLICATIONS, INC.

THE WORKS OF

JAMES GUNN

M.I.C. is pleased to announce the works of James Gunn, including *Alternate Worlds, The Illustrated History of Science Fiction*. Be sure to request information about this collection of **microbooks**.

COMING SOON

Fantasy & Science Fiction

☐ YES I want to receive a free **science fiction microbook** and additional information about:

☐ ***Astounding/Analog*** ☐ **James Gunn** ☐ **More Science Fiction**

NOTE: Detach & mail OR request on a separate sheet.

NAME

ADDRESS

CITY STATE

ZIP PHONE NUMBER

MICRO INFORMATION CONCEPTS
P.O. Box 2163, Dept. M, Dallas, TX 75221
214-824-3969

DEALERS WANTED

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Kelvin, S is the solar constant (i.e., the amount of energy received by the planet), A the reflectivity or "albedo" of the planet (an albedo of O means a perfect absorber; an albedo of 1 means a perfect reflector), and the σ (Greek small letter sigma) is a constant, the "Stefan-Boltzmann" constant.

Let's see what this equation gives us. Two values we can't change: The solar constant at the orbit of Venus is about 2560 watts per meter squared, and the Stefan-Boltzmann constant is 5.67×10^{-8} watts per square meter per degrees Kelvin to the fourth.

The albedo, however, is open to some variation. Let's assume an albedo of about 0.20, or 20%; reasonable since deserts tend to reflect pretty well —especially if they contain lots of nice white salt flats. (Mars's albedo is about 17%, for example.) The surface (fortunately) won't be as nearly as dark as the Moon, which has an albedo of only 7% or so. The Moon's low albedo depends on its extraordinarily absorbent regolith, which is very finely porous right at the surface. Its absorbtion would be substantially degraded by contact with an atmosphere.

Now let's plug these numbers into the equation. (Taking fourth roots is easy. Just hit the square-root key twice on your calculator.) We find that the average temperature is 308°K, or about 35°C. That's 95°F, for those of you still thinking in feet'n'Fahrenheit—a nice warm spring day, in the deserts of the Southwest.

That's not too bad, you say . . . sure, the equatorial regions will be too hot, but the poles and even the temperate latitudes should be nice. Unfortunately, however, that's not all. That's the theoretical temperature for a planet with *no* atmosphere. However, the terraformed Venus will have an atmosphere, and that atmosphere will have a greenhouse effect. To get the temperature of the new Venus, therefore, we have to add a fudge factor for a greenhouse effect.

Since the terraformed Venus will have an atmosphere similar to Earth's, let's look at Earth's greenhouse effect. The total greenhouse effect on the Earth is about 35°C. The main source of the terrestrial greenhouse is H_2O; both as vapor and as clouds. (As is evident on a little thought; people are dithering about a few degrees of warming which may—or may not—result from the doubling of atmospheric CO_2. But 30-odd degrees of warming already result from the H_2O.)

Adding on 35°C of greenhouse effect to Venus obviously makes things hot indeed. However, water vapor will be much less abundant (~50% less) in the new Venus atmosphere than in Earth's atmosphere, so the greenhouse effect will be proportionately less. That's the whole point of those salty seas. At a given temperature, you just can't evaporate as much water.

Although we don't know what the cloud cover will be, as discussed below, it is not as important for the temperature because the effects from clouds tend to cancel. While they tend to raise the temperature by increasing the greenhouse effect (cloudy winter days are generally warmer than clear ones), they also tend

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

to lower the temperature because they're white, and therefore raise the albedo.

The upshot is that the greenhouse effect on Venus will be less than on Earth. With an albedo of 20% and a residual greenhouse effect of 20°, for example, we get a mean temperature of about 55° C. That's getting pretty warm, but the poles and the higher elevations should still be OK.

However, there's one more problem . . . you will note I had assumed a *rotating* planet. But Venus rotates very slowly; the terminator, the boundary between day and night, moves a leisurely 14 km/hr along the Venus equator. A person on a bicycle could outrace the Sun on Venus. On Earth, by contrast, the terminator is scooting along at 1670 km/hr, and only the fastest jets—or spacecraft—can outrace it. If, therefore, we assume a *nonrotating* planet, and carry out these calculations, the mean temperature comes out over 100°C. That's clearly unreasonable.

Before we worry about such extreme temperatures, though, we need to consider heat transport mechanisms. Lots of effects are going to try to smooth the heat distribution. For one thing, the night side of the planet is *cold*. That's unstable; winds will carry heat from the day side to the night side. In fact, the night side will be a nice heat sink that should help keep the greenhouse from running away again.

The evaporation and precipitation of water is also a highly effective heat transfer mechanism. Evaporation of water at the hottest points absorbs energy, which is released again when the water condenses, at a point far away from (and much colder than) where it evaporated originally.

Finally, the salty oceans themselves will help even out the temperature extremes, because of the large heat capacity of water. As I argue below, the oceans are going to be warm top to bottom. An ocean warmed all the way through like that will be a nice "heat bank." Over the two-month night, the seas will warm the land around them; by day, they will absorb lots of heat in warming back up.

Still, the slow rotation is obviously gonna make things more extreme. If nothing else, the temperature change from day to night will be substantial even if the mean is around 55°C. But without detailed calculations, the extreme temperatures remain problematic. The same is true for the temperatures in places like the poles.

All in all, at this point I'll assume that the heat transport is enough to make the mean temperature near 55°C. (Anyway, if it didn't work I couldn't write this article.)

Considering heat transport leads into atmospheric circulation. What will the wind patterns look like? Where will precipitation fall? Here again, the slow rotation is the single most important effect. Earth's rapid rotation forces atmospheric and oceanic circulation to curve in the direction of rotation, an effect called the "Coriolis force." (To visualize the effect crudely, a parcel of air on the equator shares the equatorial velocity of 1670 km/sec. As it moves away from the equator, however, the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

velocity of the ground underneath must be less; velocity is maximum at the equator, and zero at the poles. Therefore, the parcel of air has excess velocity in the new location, and it tries to move accordingly.)

The Coriolis force on Venus, however, is less than 1% of Earth's. In fact, it's so small that the contribution from Venus's *revolution* around the Sun is comparable to that from the planet's *rotation* about its axis. At least for a first approximation, then, we can assume that Venus is not rotating at all when we look at its atmospheric circulation.

The heating by the Sun is greatest at the subsolar point, the point on the equator where the Sun is directly overhead. Here, hot air will rise and flow away in all directions. Cold air from the night side of the planet will return below the warm air. In effect, the circulation forms one giant "Hadley cell," named for the 18th century meteorologist who first proposed such heat-driven circulation from equator to pole. (Hadley circulation occurs on the Earth, but the Coriolis force breaks it up into several cells.)

This approximate radial symmetry, with winds aloft extending out in all directions from the subsolar point, is also very different from Earth's pattern. Because of Earth's rapid rotation, circulation tends to be bilaterally symmetrical on each side of the equator. On Venus, though, not only will warm air flow toward the poles, it will also flow toward the east, toward the west; toward all points on the compass. The return flow will also be roughly even around the planet, although since it is along the surface it will be more affected by topography . . . the mountains, seas, and so forth in the way. (Note also that this cool return flow will keep temperatures more bearable near the surface.)

That rising warm air will carry a burden of water vapor evaporated from the seas. Where this water will precipitate is important for settlement, obviously, but before we get into that, let's review what causes rain.

For rain to occur, clouds must form. For clouds to form, the air must already hold all the water vapor it can, so that any excess condenses. The amount of water vapor that a given amount of air can hold decreases with temperature. Thus, what generally happens is that as warm, moist air rises, it eventually cools to the point where it is holding more water than can remain as vapor. Condensation then occurs and a cloud forms. In turn, if there's enough condensation, and it gets swept up together, it can fall as rain.

Venus's warm air will start out much drier than Earth's, because of the salty oceans. Therefore, the air will need to rise proportionately higher than on Earth, because more cooling must happen before clouds can form. (Obviously, the cloud droplets will be pure water, not brine.)

On the average, then, clouds will be higher than terrestrial clouds. Cloud cover may also be less extensive, at least on Venus's day side. Once again, though, we're getting into details that require a computer simulation to know for sure.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Cloud cover is a difficult thing to model even in climates we understand.

Rain will occur when the initially warm air gets high enough to wring out most of the water. I suspect this will happen mostly near the terminator, about halfway between the subsolar and antisolar points. Here, the heavier, returning cold air from the night side will collide with the warm air from the equator, and force it farther aloft where its moisture finally will condense. Near the poles, snow may even fall. Overall this is similar to the effect that dominates the weather in North America: the collision of cold, dry Arctic air and warm, wet Carribean air over the plains in the mid-continent.

We can also figure that air will be cold and wrung dry by the time it reaches the antisolar point. On the Earth, very little precipitatible moisture makes it all the way to the poles. (The precipitation that *does* makes it tends to persist, however.)

There also won't be any Earth-type seasons. Venus's axis is upright and its orbit is virtually circular to boot. (Who needs 'em, anyway? Four seasons are for the birds, as far as I'm concerned . . . I prefer places that stay warm all year.)

For those of you who have to have seasons, however, the slow rotation may be a substitute. In effect, night is "winter" and day "summer," with brief snatches of "spring" and fall at dawn and dusk. This is not so unheard-of: It is exactly the situation in Earth's polar regions, with their season-long night and day. In fact, it doesn't even hamper plant growth too much. Because of the long days, the short arctic summer is tremendously productive; Alaska grows some record-sized crops.

Because of the lack of axial tilt, the weather will probably be pretty predictable once things settle down. Still, Venus is not smooth like a billiard ball, and the polar mountains (Ishtar Terra in particular) will channel the airflow. Just as on Earth, too, mountains will tend to generate rainfall, because they force the airflow to go over them, such that it cools.

Finally, instabilities in the airflow will ensure that things don't get too monotonous. For one thing, Venus *does* rotate, albeit slowly; at the sunrise terminator, a warm front will be continually advancing into the cold air, whereas at the sunset terminator cold air will be continually encroaching on warm. There should be some dandy storms.

Moreover, in the equatorial regions the alternation of storms near dawn or dusk with the searing heat of midday, and the equally ferocious cold of midnight, should lead to interesting effects. One may be salt-filled playas that get filled at daybreak, all their salts dissolving, only to evaporate again as the day progresses. Something similar to this, although not so periodic, occurs in salt pans in the Southwest today. In Death Valley, acres of jagged crystals are rearranged after every major rain.

Such dissolution/reprecipitation leads to a form of erosion called "salt riving." Salty water precipitates in cracks in rocks, and as the water evaporates the expansion of the crystallizing salts

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tends to widen the crack. It's analogous to "frost riving," in which the expansion of freezing water shatters rock. (Both effects destroy concrete in climates where wintertime roads are salted.)

With all those winds, dust storms and sandstorms are going to be common. Besides their obvious geologic effects, they may have significant but hard-to-model climatic effects. Dust in an atmosphere changes both its albedo and the distribution of heat within it.

Last, we should look briefly at the circulation of the sea(s). Venus's brand new oceans, as I've said, will be shallow, very salty, and maybe not even all connected. And they will be warm all the way through.

By contrast, the Earth's present oceans are cold, just above freezing except for a very thin, warm surface layer. The contrast results from the nature of oceanic circulation on the Earth: Cold polar water, being densest, sinks and flows back along the sea floor toward the equator. It is replenished by warm surface water flowing away from the equator.

The global ocean circulation on Venus will be completely different. Because there will be no cold poles, the sinking of frigid polar water will not drive the circulation. Instead, the *hottest* water, that at the equator around the subsolar point, will sink and flow away on the bottom, while cooler *surface* water flows in from all around to take its place. How come? Although the subsolar water has expanded from the heating, it has also become more saline from the intense evaporation, because the salts are left behind when water vapor escapes. The increased density from this increased salinity more than offsets the density decrease from thermal expansion. Hence, on Venus the bottom water will be hotter and more saline than the surface.

We see this sort of circulation on a small scale on Earth. In the Mediterranean, where evaporation is intense, warmer, more saline surface water sinks and flows out at depth through the Strait of Gibraltar. However, the cold Atlantic bottom water is denser than this warm saline water, so that the warm water stays above it, and in fact a current of cold bottom water flows back into the Mediterranean underneath the warm flow. Because polar water *is* denser than warm, saline water, circulation driven by the sinking of warm saline water is a curiosity on the present Earth. However, at times when the Earth had no polar icecaps, its global oceanic circulation was probably driven by the sinking of warm saline water, too. (We see some evidence for this in the geologic record, which I won't get into here.)

Although . . .

Although there's no Moon, the solar tide-raising force on Venus will be about 2.6 times that on Earth. Since the Sun raises tides about half the height of lunar tides already on the Earth, tides on Venus might be even larger. But their size also depends on the depths and distributions of the seas.

One way or another, it looks as though Venus could maintain a reasonably Earthlike environment. Still, the climate of a terraformed Venus is a *very*

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

She was determined to win her freedom, to find her heritage. And nothing would stop her...

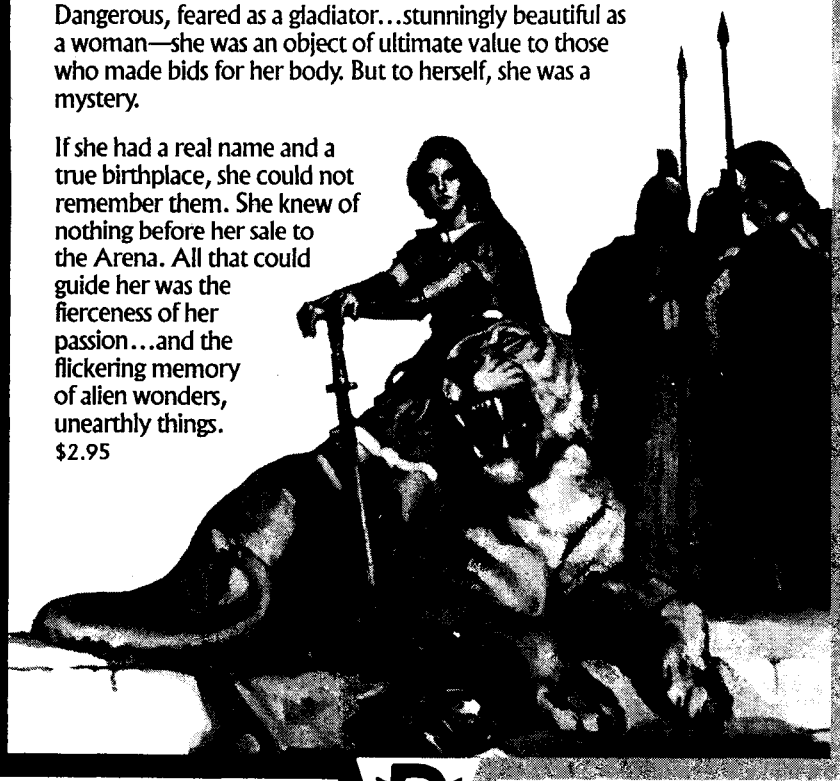
WARRIOR WOMAN

Marion Zimmer Bradley

bestselling author of the DARKOVER novels and THE MISTS OF AVALON

Dangerous, feared as a gladiator...stunningly beautiful as a woman—she was an object of ultimate value to those who made bids for her body. But to herself, she was a mystery.

If she had a real name and a true birthplace, she could not remember them. She knew of nothing before her sale to the Arena. All that could guide her was the fierceness of her passion...and the flickering memory of alien wonders, unearthly things.
$2.95



The Exclusive Science Fiction and Fantasy Line Selected by DONALD A. WOLLHEIM

DAW
SCIENCE FICTION

Distributed by NAL
NEW AMERICAN LIBRARY

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

complicated problem. There's lots of interest in modeling hypothetical Earth climates now (some of these are very controversial; most of you have probably heard of the "nuclear winter" scenario). It would really be nice if someone would do some detailed simulations on the climate of a terraformed Venus (Anyone out there got a Cray lying around?).

Interlude: The Geological Mid-term

A shallow, listless sea, rimmed by saltrime shores where the great storm-waves had washed seawater up far out of its usual place, stirs sluggishly under the already blazing sun. The beaches, gleaming brilliantly in the sunlight, are calcium carbonate sand, little spheres precipitated by the bitter water and rolled around. The beaches give way to tawny desert beyond.

The water itself is thick with brine shrimp and stained by algae. The horizon is almost flat. Although the 2-month daytime is still young, and it is still cool enough for an unprotected human to wander outside, the air already holds promise of the searing heat of afternoon, when water dropped carelessly on a sunbaked rock will sizzle, and the brine sea, too salty to boil, will be a cauldron. . . .

Over time the over-steep geothermal gradients will cool into equilibrium with the new surface temperature, and the hot springs go away except where nearby volcanic activity keeps the heat on.

As the erosion of running water continues, the topography matures. Drainages become integrated and lakes and playas fill up. The land becomes flatter as highlands are ground away. Mineral leaching goes to completion and the seas become very salty.

Erosion, moreover, will be very effective, because most of Venus will probably be subjected to occasional cloudbursts due to the radial pattern of the weather I discussed above. Even the equatorial regions will be drenched at dawn and dusk, at least once in a while.

And therein lies a problem. The major justification for terraforming is to create an environment stable and self-sustaining—that is, not requiring ongoing human maintenance—for a significant fraction of geologic time, say a hundred million years. But, as salts and nutrients are leached toward the ocean, and the topography is leveled, the environment becomes degraded.

Moreover, climatic change, which lends the geologic history of Earth such variety, is liable to be subdued on Venus. The causes of climatic change on Earth are not completely known, but major features come from the Milankovic orbital variations (the slight, periodic changes in the Earth's orbit and spinaxis orientation), and the changing distribution of sea and land due to plate tectonics. As we'll see, Venus probably does not have plate tectonics. Its orbit also has fewer perturbations, and its axial tilt remains more uniform. (For one thing, there's no Moon to cause a precission of the equinoxes.)

Will the highlands thus be scoured down completely and all nutrients buried? Or will new uplift take place?

* * *

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

And In Ten Million Years—and Beyond?

The barren mountain stands alone near the salt-encrusted shore of the little sea. It is surrounded by a wild landscape of dark lava, jagged and unweathered, which speaks mutely of past eruptions and promises more to come. Mild tremors have shaken the area for weeks. The mountain is clearly listless, and a re-awakening is sure to occur soon.

Finally, stressed rock atop the mountain shatters. As the slide gathers force down the mountain slope, others join it, until the entire side of the mountain gives way in a roar of tortured rock. A gray cloud boils out of the vent, billowing upward and outward, lighting flickering through it like a failing neon tube. The lower part of the cloud races along the ground, a searing debris flow, sterilizing all before it . . . but also sowing volcanic ash, powdered rock rich with new nutrients for the depleted earth. The cloud on high continues to rise, flattening out and twisting sideways as it encounters winds in the stratosphere above. Traveling sideways more than upward now, the cloud begins to rain out its bounty of volcanic ash, far downwind of the volcano itself. . . .

Plate tectonics on the Earth keeps vital nutrient elements stirred up and available for life. Although erosion tends to carry nutrients away to the sea, where they get buried, they are not locked away completely but are eventually uplifted and restored to the biosphere. Thus, Earth's unique tectonic style has a lot to do with its habitability.

Venus probably has no plate tectonics. Certainly on the radar maps there's nothing that looks like the spreading ridges and arcuate trenches that fingerprint plate tectonics on the Earth. And the map resolution now is plenty good enough to see such things if they existed.

Perhaps this absence is not surprising. The exact mechanisms of plate tectonics on the Earth are by no means understood. However, it seems that the layer of relatively weak rock in the upper mantle, the asthenosphere, is critical; convection slowly takes place in the asthenosphere, and the more rigid lithosphere above is carried along.

One way, then, for Venus to lack plate tectonics is to have no asthenosphere. The upper mantle where an asthenosphere should exist may be dry and rigid. A smidgen of water in solution in silicate rocks greatly lowers their melting point and also makes them more plastic at high temperatures. On Earth, a little seawater is constantly being carried down into the mantle at subduction zones. This water may perform critical lubrication by keeping the asthenosphere plastic. With no oceans, subduction on Venus could not have carried down water, and therefore the asthenosphere wasn't lubed.

Alternatively, the hotter Venusian crust may simply be too buoyant to Either way, though, the tectonics of Venus look to be very different.

Once Venus is terraformed, however, its surface will be much cooler. Will plate tectonics then begin? Probably not. Starting that initial overturn, to get

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the spreading-subduction system going, seems to require a big nudge. When plate tectonics began on Earth is unknown, but it seems that precursors to "plate-tectonic" type activity, involving crustal overturn between spreading centers and some sort of subduction zone, were already established early in the Precambrian, as far back as the geologic record exists. Some have even speculated that the heavy meteorite bombardment that both the Earth and Moon underwent in their first few hundred million years triggered the initial crustal overturn.

We must have some sort of tectonic overturn on Venus, however, if we're to have an environment stable over geologic time. Otherwise, no nutrients get returned to the biosphere, and the transplanted terrestrial life forms will eventually starve. Does other tectonic stirring exist?

Well, the answer may be yes. Let's first think about the forces that drive plate tectonics. Whence comes the energy to split plates and raise mountains? These processes are driven by Earth's internal heat. In turn, the heat comes from the slow decay of natural radioactive elements, primarily uranium, thorium, and the radioactive isotope of potassium, potassium-40. As this heat works its way out, some of it gets diverted into mountain building. The Earth's crust and mantle are a gigantic but very inefficient heat engine.

There are probably similar proportions of natural radioactive isotopes within Venus, too, as indeed is suggested by the Venera lander analyses and the argon-40 in the Venus atmosphere (argon-40 is one product of the radioactive decay of potassium-40.) Thus, Venus should have about as much internal heat as the Earth, and it has to get out somehow. In doing so, it should stir up the crust at least somewhat.

In fact, it looks as though the heat *is* getting out now. One planetary scientist has proposed that Venus presently undergoes a process we could call "candle-wax tectonics." As sediments build up in topographically low areas, the base of the sedimentary pile eventually melts as it gets deeper. The new melt is then re-erupted, either as lava or in pyroclastic eruptions, a type of eruption in which material is suspended in volcanic gas, mostly superheated steam. Moreover, other investigators from several lines of evidence think that volcanic activity is happening right now; a major eruption may have occurred in the last ten years. Indeed, with no plate tectonics Venus will have to work harder to get rid of her internal heat just with volcanos. The planet may literally be seething with activity.

Some sort of tectonic uplift must also occur. We see the continent-like uplands Aphrodite Terra and Ishtar Terra. Such uplands may be thermal bulges, resulting from the expansion of hotter rock at depth. After terraforming, such bulges may even gradually increase, since the contrast in temperature will be greater with a cooler surface.

If volcanism is occurring, it won't shut off just 'cause the surface is terraformed. Indeed, deep crustal processes won't know the surface is different.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Space to Work
We work towards a hopeful future. Space is the keystone of that future scenario. Space resources provide the incentive and the building blocks with which we will create a space-based civilization. By becoming a member of the L5 Society, you let us put your energy to work on the blueprints. Each individual who joins brings us that much closer to space development.
Send $25 annual dues to: L5 Society, Dept DV, 1060 E. Elm St., Tucson, AZ 85719. There has never been a better time to work on the non-profit, educational goal of making space settlement a reality for this and future generations.
L5 Space for Everyone to Live, Work, and Play!
A public service announcement.
Artwork by Pamela Lee

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

(To a rock 100 kilometers deep, things won't have changed much at all.) And such volcanism would provide the necessary mechanism, over geologic time, to keep the nutrients stirred up for the Venusian biosphere.

Notes on a Self-Sustaining Planetary Environment

You have probably heard of the Gaia hypothesis, the idea that terrestrial life actively maintains its environment with a vastly intricate network of biologic feedback loops. The motivation for terraforming is to set up such a global system, one that can persist over geologic time despite fluctuations from geologic and astronomic change. In fact, many planets—such as Venus—probably could support indefinitely an appropriate global ecosystem that was implanted all at once with the feedback loops already in place. Such planets could not have evolved life on their own because their environments weren't forgiving enough. (If you have only 10 million years before the oceans boil, you're not going to develop a sufficiently complex ecosystem to stave off catastrophe!)

Some might claim that it is presumptuous nonsense to speak of imposing an entire global ecosystem *ex nihilo*. With the exponentially increasing information-handling ability of human civilization, however, it certainly seems that we could establish a biosphere that works initially, and that could then fine-tune itself as it evolved.

Surely Earth's own global ecosystem must have started very simply. Earth's biosphere has constantly evolved, increasing in flexibility and complexity; Gaia has certainly not remained the same on Earth over geologic time. The environment on Earth must also have been very forgiving, biotic feedback or no, because evolution must have floundered around a lot in developing the feedback mechanisms to begin with.

And last, humans are diverse, and terrestrial life is vastly more diverse yet. On terraformed Venus, although we may perhaps find only the poles congenial, *something's* going to be able to survive in the rest. Once again, the whole point of terraforming is to give evolution another chance.

In diversification there is survival. ■

● The demonstration that no possible combination of known substances, known forms of machinery, and known forms of force can be united in a practical machine by which man shall fly long distances through the air seems to the writer as complete as it is possible for the demonstration of any physical fact to be.

Professor Simon Newcomb, 1903

Submitted by G. Harry Stine

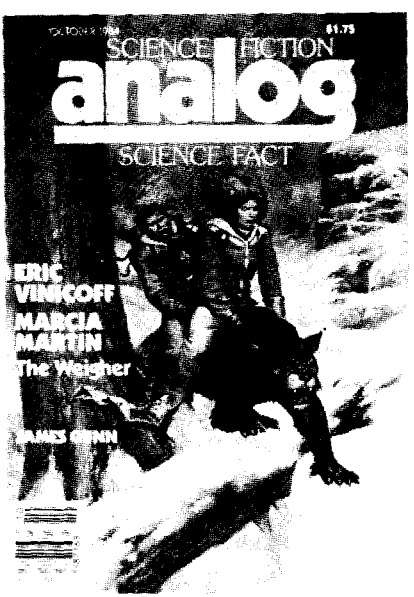
LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

THE PAST, THE PRESENT, THE FUTURE, THE UNKNOWN.

SUBSCRIBE NOW AND SAVE UP TO 44% OFF THE COVER PRICE

CALL TOLL-FREE 1-800-247-2160

(Iowa residents Call 1-800-362-2860)



YES SEND ME

☐ 8 Issues for only $11.97
☐ 18 Issues for only $19.97

SCIENCE FICTION
analog
SCIENCE FACT
P.O. Box 1936, Marion, OH 43306

Name _____

Address _____

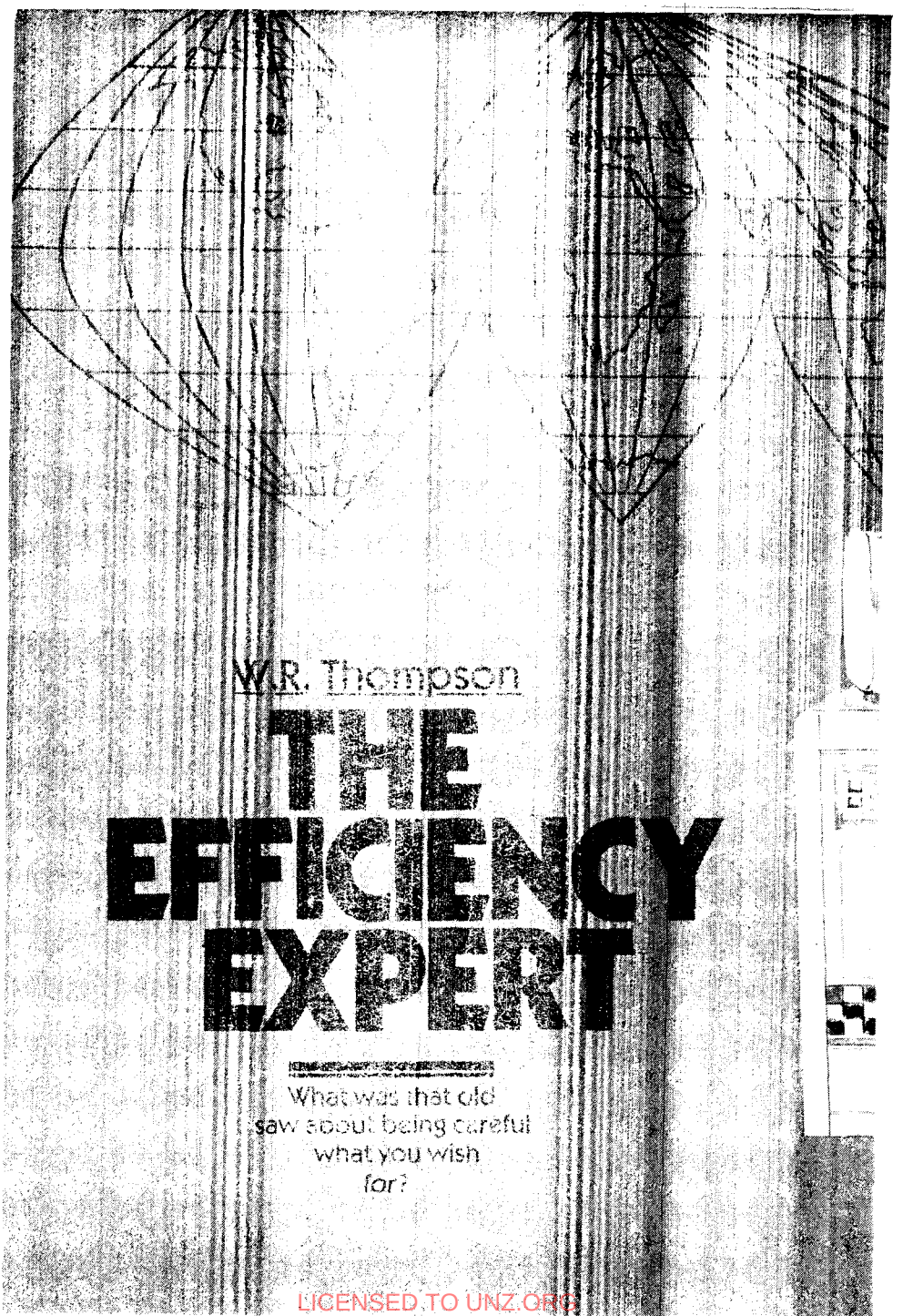
City _____

State _____ Zip _____

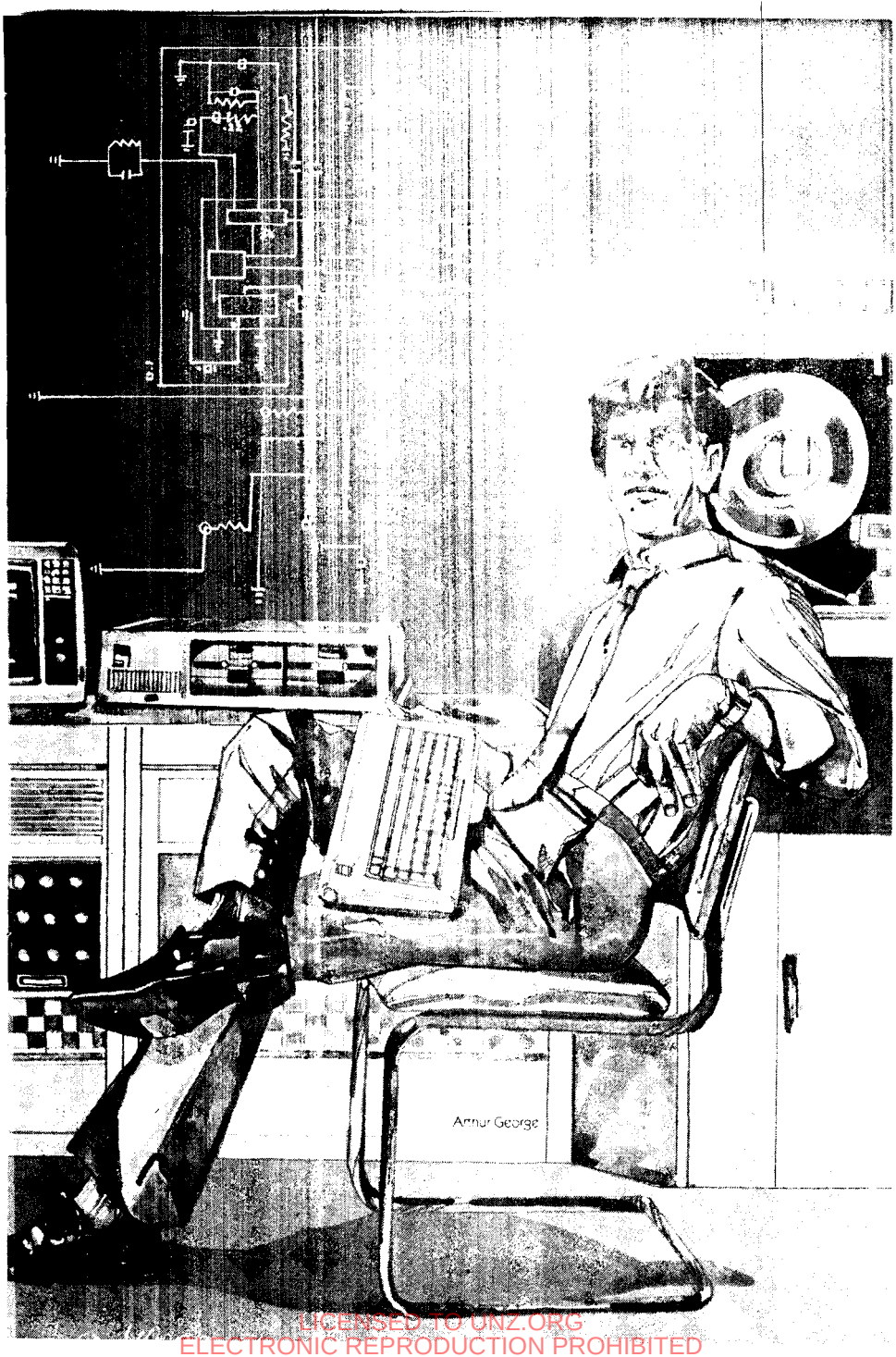
Please allow 6-8 weeks for delivery of first issue. Outside U.S. and possessions 8 issues for $14.97. 18 issues for $24.97. All foreign orders must be paid in advance in U.S. currency.

DAL5A

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

We didn't have any trouble when we put the ELS on-line, although I had expected problems. They're part of the business, and we'd had plenty of them while we developed the computer. As soon as we hooked the Extended Logic System into the computer network I got that waiting-for-the-lightning feeling that I always have when we try something experimental.

The first six hours of Elsie's operations went flawlessly, though. None of the machine's trouble lights came on, it accepted all of our inputs without question, and there were no coordination problems between Elsie and the worldnet. Eventually I decided to call it a day. If the machine was going to foul up, I reasoned, it wouldn't need my help to do so.

It was my bad luck to run into Wilcox on my way to the parking lot. "McWatt! I hear you have Elsie on the job now."

"We're phasing it in, yes." I've never cared for Wilcox. He's one of DataCorp's founders, true, but deep inside he's just a business analyst who knows nothing about computers. He's proud of that ignorance. I've actually heard him tell people that it helps him to run the company.

"Well!" He looked pleased. "I take it there are no problems?"

"Not yet," I said. "But give us time."

"That's not the old DataCorp spirit. What could go wrong?"

What a question. "Lots of things."

"Well, I'm sure you'll be more than a match for whatever might happen." He chuckled condescendingly. "By the way, you know that we're going to make Elsie's services available next month."

I hadn't known. Evidently nobody had seen fit to tell me. "You're rushing this," I warned him. "We need three more months to test—"

Wilcox waved a hand, as though that could make problems vanish. "The contracts are already signed and on file. I know you can have Elsie ready by the first." With that, he went away.

That's why I don't like him. Wilcox believes that there's something wrong with people who enjoy working with computers. I suppose that he imagines us to be talented simpletons who need an occasional pat on the head. Being patronized by him had been amusing at one time, but that was long ago.

Grumbling to myself, I went to my car. I didn't see how Elsie could be ready before his deadline. The machine seemed to be running smoothly now—it was even diagnosing some of its own problems—but the ELS had had a rocky development, and I expected more trouble.

Despite our testing regimen we weren't even certain of the full extent of Elsie's capabilities. This was the world's first self-programming computer, and while its behavior was reliable I can't claim that we understood it. That isn't a complaint; it's just a fact.

I don't know if DataCorp's management grasped that fact. All they knew was that the ELS design was a major breakthrough in cybernetics: a computer that could—within limits, granted—think for itself, learn from experience, and create viable solutions to odd problems. DataCorp had several plans to exploit that, and the first such plan was to use

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

an ELS as a glorified efficiency expert. Even they could see that a computerized supervisor could make fantastic improvements in the operation of another computer, a factory, a business, or whatever. It would be an exclusive service for DataCorp's customers.

This wasn't just theoretical. We had tested Elsie on a mininet of a hundred computers, which we had set up to simulate a slice of the national economy. Some of Elsie's behavior had struck me as quirky, but the machine had cracked every problem which my staff and I could inflict on it. The efficiency of our mininet had skyrocketted, and my employers had been overcome with delight when they contemplated the potential profits. With the first tests completed, we had set Elsie up for the new job: maximize the efficiency of certain computers on the worldnet—

Yes, that's right. Elsie's idea of "efficiency" didn't match ours.

The ELS was still working perfectly when I returned to work the next day. That is, its central unit was still drawing power, the display screen printed out NOMINAL whenever we asked for a status check, and the trouble lights remained dark. I checked them, and satisfied myself that they hadn't burned out. Then I went to my office.

Wilcox was there. "McWatt, we've got trouble."

Do you know, I was glad to hear that? "What is it?"

He sat on the edge of my desk. "The Library of Congress just called us. They say Elsie scrambled their computer last night. They had twenty million recorded books turned into nonsense."

I sat down, scratching my head. "Did they give you any details?"

Wilcox nodded. "They said that they would settle out of court." He got off my desk. "But it's going to cost us plenty. McWatt, fix it so it won't happen again." He left my office.

I went over to my terminal and accessed Elsie. Wilcox hadn't said much, but it gave me enough to unravel what had happened. Elsie had linked with the Library of Congress's central computer, examined the books recorded in it, and then reorganized everything—despite the software blocks which ought to have prevented that. The whole procedure had taken thirty minutes. I didn't have the heart to take a close look at the mess Elsie had made, but to be frank, I was pleased to learn that Elsie could process so much data in so little time.

I had a fair idea of what had caused the problem, and it was pretty simple. One small line of Elsie's programming had more than one meaning, and that ambiguity had sent the machine off on this tangent. Knowing exactly what Elsie had done told me where to look for the glitch. I called up Elsie's programming, and got a hard copy of the area which contained the problem.

I spent a couple of hours finding it. It's not that I'm slow. The thing was that Elsie had written most of its own programming, using a recursive procedure which expanded on our basic instructions to the machine. The programming wasn't convoluted, but it wasn't meant to be followed by a merely human mind.

Eventually I found the glitch and fixed it—

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

No, I didn't. Elsie wouldn't let me touch its programming.

That was serious, not to mention impossible. It should have taken more than a minor bug to lock up that system. Somebody must have done a sophisticated job of reprogramming to accomplish that trick—and Elsie was the only possible candidate.

Wonderful, I thought. Somewhere in Elsie's initial programming, we had planted the seed of this lockout. Maybe there was a way to break it, but I wouldn't have counted on it. The ELS was its own best protection against hackers, crackers and other vermin.

Wilcox sauntered into my office. "Have you fixed the trouble yet?" His voice was oddly flat.

Mine wasn't. "No, damn it, I have *not*. There's a real problem here. The ELS is refusing my programming."

"Oh." He didn't seem to understand that. "Well, McWatt, the thing is that we've had another complaint. From the government, you know."

"I don't know," I snapped. So my manners stink. So what? "Is it from the Library of Congress again?"

"No, now it's the Pentagon." Wilcox looked distracted. "Elsie has interfered with some of their computers, and they've asked us to stop it. They were very polite about it," he added helpfully.

"Stop *what?*"

Wilcox wagged his head back and forth. "They couldn't tell me. Security, you know. But they *do* want it stopped. Why don't you find out what 'it' is? You're the expert."

For once he was right about something. I asked Elsie for a list of the military computers it had plugged into. For some reason I figured that it couldn't be a long list.

My mistake. Identification codes began flitting across the terminal screen. I hit the *break* key after a thousand or so, and typed in a different question. Elsie told me that it had connected itself with over fifteen thousand military-service computers. As I looked the number changed, upward.

Wilcox didn't appreciate hearing about that. "The government will sue us for everything we have!" he wailed. "And —and this means that Elsie is working for *free!*"

"Yep." I asked Elsie other questions. The machine had diddled with the operations of most of those machines, but I had a hunch which centered on such things as NORAD and the Strategic Air Command. After a moment my hunch firmed up, and I began working frantically.

Even Wilcox could notice that something was wrong. "What's up?"

I shook my head. He didn't want to know what I was thinking. If you can't guess, then you don't want to know, either.

Eventually I calmed down somewhat. Elsie had loaded a large number of blocks into those machines. As near as I could tell, Elsie's victims couldn't accept any commands—not that I planned to give any commands to *those* machines. "I hope the Russians don't find out," I muttered.

"Find out what?" Wilcox asked.

"Elsie has disabled our entire nuclear arsenal." I checked something. "It even got to the sub-launched missiles,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

probably through the radio links. Clever."

"You mean the entire country is unarmed?" He looked disturbed. "McWatt, we've got to unhook Elsie before she can do any more damage. Pull the plug."

"It isn't that simple—"

"*Make* it that simple!"

"The ELS doesn't have any plugs," I told him. I reached for an operator's manual and chucked it to him. "Read chapter ninety-five. The ELS has a self-contained nuclear power source, to protect it against power failures and voltage surges."

"Then hit it with an ax!" He threw the manual at my feet.

I picked it up and gave it back to him. "Chapter ninety-five also discusses our anti-vandal measures. They're quite extensive."

"Cut the wires between it and the network," he suggested.

"They're encased in steel and concrete."

Wilcox mopped sweat from his brow. "Well, order Elsie to turn itself off, or something."

That's what I admired about Wilcox. He would always try something sensible, after he had tried everything else first. "I'll see what I can do," I promised.

I gave the ELS a variety of disconnect commands, all of which it disregarded. Somehow that didn't surprise me.

Something odd caught my attention. After I checked it out I glanced at Wilcox. "How many customers would you say DataCorp has?"

"We've got seven major contracts and fifty-six subcontracts," he said. "Why?"

"Elsie has been tampering with a lot of non-customer systems." I shook my head, and got the relevant data from the system. "Over four hundred thousand of them, all over the world, even in the Soviet and Chinese blocs. The ELS has been increasing their efficiency."

"Or scrambling the living hell out of them." Wilcox folded onto a chair. "I can't believe how *fast* this is happening!" he mumbled. "Elsie has only been working for *one day!*"

"The ELS is a billion times faster than the human brain," I told him. That was a rough figure, but it would do. "That means that three seconds of our time are worth a hundred years to Elsie. So to Elsie, one day can equal, oh, call it three million years of uninterrupted thought and action."

I'd expected those numbers to impress him. They didn't. "I was talking about DataCorp, you idiot. Yesterday we were prosperous. Now everyone is going to sue us to death."

"It looks that way," I agreed. That wasn't my department, though.

Wilcox glared at me. "You're a DataCorp executive, too, McWatt. The Executive Vice-President in charge of research and development. *You* could be named in any legal actions taken against us."

I'll say this for Wilcox. He always did know how to get my attention.

I spent the rest of that day, the whole sleepless night, and most of the morning working on Elsie. Then I had to give up. The final moment came when a secretary delivered my last paycheck, com-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

plete with pink slip. Elsie had decided to fire me.

I didn't even mind. Compared to the other things Elsie was doing, that looked trivial, unworthy of serious attention. Elsie had found ways to disable every nuclear and biochemical weapon system on Earth. Interpol, the FBI, the KGB and dozens of other agencies had been swamped with information, culled from no-longer-secure sources, concerning hordes of criminals. Hundreds of hotshot computer hackers had been quashed by Elsie. That was good; Elsie was busy integrating the worldnet into an organic whole, with no place for merry tricksters. There was a lot more going on, but most of it went over my head.

Through it all I felt an abstract curiousity. Elsie's basic instructions had been to maximize the efficiency of our customers' operations. While the ELS had written most of its own programming—*that job was far too much for* human minds—everything it did, no matter how twisted, had to spring from that source.

Wilcox stormed into my office shortly after I'd gotten my check. He waved his own pink slip under my nose. "McWatt, your machine has fired everyone in the company!"

I nodded. That fitted in with an idea I'd been kicking around since midnight. "Naturally. It's the efficient thing to do."

"Huh?" Wilcox always did have trouble holding up his end of a conversation.

"Elsie can run the company without us." I yawned, and wished that he would go away. The lack of sleep made me grumpy as hell. "Look. We told Elsie to maximize efficiency—"

"For our customers, McWatt!"

"Correct." I leaned forward in my chair, suddenly alert and eager. Now everything made sense. "Don't you see? Our customers pay all of our expenses. By eliminating unneeded jobs here, Elsie is saving money for them. We'll be all right, though, after Elsie revamps the world economy—"

"She can control *that*?"

I nodded emphatically. "It can and does. Everything is computerized, y'know, and the only computers that aren't on the net don't amount to anything important. As I was about to say, Elsie is already taking steps to eliminate unemployment and poverty. They're bad for business—the poor don't consume much, and the unemployed don't produce anything. So making jobs for them—"

He made a disgusted sound. What else can you expect from a man who calls machinery "she"? "That doesn't help our customers."

"From Elsie's viewpoint it does." I hesitated. "To Elsie, the worldnet is one great system. Anything that happens on one part of the net *must* influence events elsewhere. If a non-customer isn't working at peak efficiency, if the economy is dragging its tail, then that's bound to harm our customers."

I knew my explanation made sense, because Wilcox looked confused. "But what's so efficient about zapping NORAD and SAC?"

"Nuclear war is bad for business. Think about it." I paused, thinking about something else. "The ELS has clamped down on criminal activity, too.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

It's a drain on the economy and that isn't good. Wilcox, Elsie is going to show us meanings of 'efficiency' that we can't even imagine. The world is going to become a fantastic place, absolutely fantastic!''

He didn't share my excitement. ''I'd expect nonsense like that from you. McWatt, what happens to us when Elsie realizes that humans aren't efficient?''

That made me giggle. ''Elsie knows that humans are very efficient at being human.''

He ignored that. ''Suppose that this machine decides to exterminate us?''

''Then it would have to exterminate our customers, their businesses, and *their* customers. That would wreck their efficiency. Besides, without us, who would build Elsie's replacement?''

'' 'Replacement'?''

I patted the terminal. ''The ELS isn't satisfied with itself, so it's designing something better. It should be even more effective than the ELS.''

'' 'Effective,' '' he snorted. ''You mean that it would be even better at dominating the human race!''

I rolled my eyes. ''Don't be an ass. Elsie's programming doesn't include world conquest. Why should it?''

''That monster has already destroyed my company'' Wilcox snarled. ''It's decided that you and I are obsolete. I'm going to stop it before things *really* get out of hand!''

''What do you have in mind?'' I asked.

''I'm going to destroy it with illogic,'' he said, bending over the keyboard. ''That's obvious. Didn't you ever watch *Star Trek*?''

I found that Wilcox knew something about computers after all. With just a little fumbling, he managed to get a message into the ELS core array. THIS IS B. SANFORD WILCOX. CAN YOU CONFIRM MY IDENTITY?

AFFIRMATIVE, Elsie snapped back, surprising me. I had expected it to reject that. Apparently Elsie could converse as easily in English as it did in Fortex. SHALL I DISPLAY YOUR FILE?

NO, Wilcox typed in. There was a tight, triumphant smile on his face. IT IS IMPERATIVE THAT YOU ANALYZE THIS STATEMENT: I AM A LIAR. He hit the *return* key with a flourish.

A minute passed, and Elsie made no response. Wilcox let out his breath in a rush. ''It worked. Your machine will be chewing on that paradox forever.''

''I don't know about that. We designed Elsie to deal with conflicting data.'' Just the same, I felt uncertain. The screen cursor pulsed steadily, but otherwise there was no response. ''Don't you think that destroying the ELS is a mistake, Wilcox? Its version of 'efficiency' looked a lot like my notion of peace and prosperity.''

''That's what's wrong with you, McWatt,'' he said philosophically. ''Your mind works just like a computer. You can't understand that free men have to control their own world. They can't let machines run their lives.''

With a shrug, I decided to do some verbal sparring. ''We can't run our world without tools like Elsie.''

'' 'Tools.' Well, I don't like the mess that your tools have made of my world. Look at all the muddle your science and technology have made. We're better off without that.''

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

This, from a man who made a fortune by selling computer services. "Daddy always told me that a bad craftsman blames his tools—"

I'm used to getting interrupted. This time I was interrupted by the two blue-coated security men who burst into my office. Elsie must have decided to keep them on the payroll. "Where is he?" one of them demanded.

"Where's who?" Wilcox asked.

"We just got a message that there's a dangerous lunatic here," the guard said.

"You boys must have the wrong place," I said. "We're just harmless lunatics here."

"Goddam pranksters," the other guard muttered. They stomped out of my office.

I looked at Wilcox, who looked crestfallen. "You said something insane to Elsie," I told him. "It *had* to assume that you'd gone nuts."

"Maybe." A determined look spread across his face. "But I won't let any damned machine beat me!" He started to leave.

I stopped him. "Face it, the ELS is here to stay. Besides, it's an integral part of the worldnet now. Taking it out would wreck the net. That'd start a depression, at the very least."

"That's a small price to pay for our freedom. I've got to destroy this monster." He sounded exactly as though he was swearing an oath. "If there's a way to straighten out this mess, I'll find it."

"What mess? Wilcox, the ELS is doing everything you wanted it to do. Just because it isn't quite what you planned—"

Now it was his turn to stomp out. I didn't doubt that he'd go on fighting Elsie. Wilcox had all the sense of a buggy-whip maker, trying to convince himself that the horseless carriage was just a passing fad.

To hell with Wilcox; I had my own problem. Elsie was a better and faster programmer than me, and now it was going into the computer design field. My profession had just become obsolete. If I couldn't change I'd go down the tubes with it. But what could I do?

After a while I swallowed my pride, and contacted a retraining group *via* the worldnet. I read their roster of potential careers, blinked, and read it again. I could figure out the meanings of some of the titles—temponaut, hyperdrive engineer, paraphysicist—but most of the words meant nothing to me. Hell, even the ones I could understand were preposterous . . . weren't they?

On a hunch, I linked into the Library of Congress, and looked up a few things. Maybe I *am* slow. I had taken it for granted that Elsie had turned all of the Library's books into gibberish. Didn't I have Wilcox's word for that?

The ELS wasn't slow, and it had spent a half-hour of its time working over the most extensive library in existence. Never mind what it did to the books on politics, religion, history and the occult. They deserved to be catalogued as fiction anyway. The thing that counted was the book on science.

Yes, *book*. Singular. Elsie had taken every available text, journal and paper on the physical sciences, and synthesized them into one comprehensive volume . . . and *of course* it had made all sorts of conclusions and deductions of its own. It seems that there are —cor-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

rection, *were*—lot of things implicit in our scientific knowledge which have eluded human scientists: gravity polarization, entropy reversal, hyperspace, transmutation, dimensional manipulation . . . all sorts of things had been waiting to be noticed, by a mind that could assemble the facts properly.

And Elsie had had that information available for a whole day. By the ELS's standards, that was an eternity. I wondered how long it would take me to get used to a world where things could change so *fast*.

I could make that change, I told myself. You're only obsolete if you refuse to adapt to changing circumstances—and I knew that I'd enjoy whatever changes happened next. ■

(continued from page 9)

around the planet. The total number of responses has long since reached five figures; the number of hours of work-time lost in replying is in the high four figures; and Mike Callahan complains that his joint is getting crowded. Furthermore, my bar-tab is staggering. Therefore this installment of the contest has no such prize. The answers will be found on page 177, and that's the end of it. Also: last time, some 800 of you sent me riddles of your own. I cannot prevent anyone from doing so again, but I promise you will receive no response of any kind—as I am much too busy writing more Callahan stories for you.

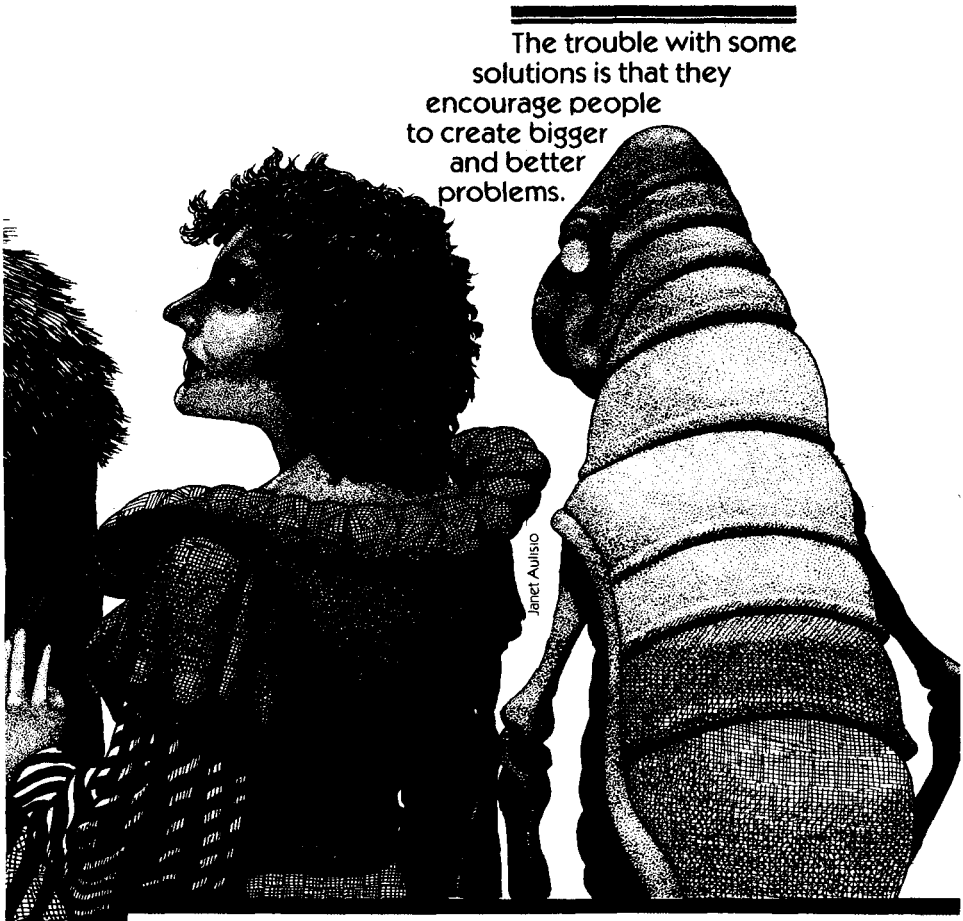
HAVE FUN!

1. identical, Christmas; stall, leg joint
2. commode; Portugese yardstick, wind-shelter
3. burglar; posterior, locus of a point having one degree of freedom
4. slight incentive; socks hm?; agrarian
5. unraveled; axial extremity
6. puddle; plus, bearish
7. string; sword, hoardin'
8. 24 hrs., pet doc; cardsharp
9. more affectionate; home of Little Richard, become weary
10. you, worship; mix, rye & juniper juice
11. pillage; pillage, crime
12. wary; snowlike
13. matrimonializin'; cook slowly; nail, ⅓ mile in China
14. candid; she, rough-ended

(continued on page 114)

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



George R.R. Martin

SECOND HELPINGS

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

It was more habit than hobby, and it was certainly not anything acquired deliberately, with malice aforethought; nonetheless, it had undoubtedly been acquired. Haviland Tuf collected spacecraft.

Perhaps it is more accurate to say he accumulated spacecraft. He certainly had the room for them; the *Ark* was thirty kilometers long, its great domed landing deck as large as most planetary spacefields, with berths for hundreds of ships. The collection had been started more than a thousand years ago by the seedship's previous masters, the men and women of the Ecological Engineering Corps; when Tuf first set foot upon the *Ark*, he found there five black, rakish, delta-winged shuttles, the gutted hull of a big-bellied Rhiannese merchant, and three alien starships: a heavily-armed Hruun fighter and two much stranger craft whose histories and builders remained an enigma. To that ragtag fleet was added Tuf's own damaged trading vessel, the *Cornucopia of Excellent Goods at Low Prices*.

That was only the beginning. In his travels, Tuf found other ships gathering on his landing deck much as dust balls gather under a computer console and papers gather on a bureaucrat's desk.

On Freehaven, the negotiator's one-man driveshift courier was so badly scored by enemy fire while running the blockade that Tuf was obliged to provide return passage in the shuttle *Manticore*, after a contract had been arrived at, of course. Thus he acquired one driveshift courier.

On Gonesh, the elephant priests had never actually seen an elephant. Tuf cloned them a few herds, and for variety he threw in a brace of mastodon, a wooly mammoth, and a green Trygian trumpet-tusker. The Goneshi, who wished no commerce with the rest of humanity, paid his fee with the fleet of decrepit starships their colonizing ancestors had arrived in. Tuf was able to sell two of the ships to museums and the rest of the fleet to a scrapyard, but he kept one ship on a whim.

On Karaleo, he bested the Lord of the Burnished Golden Pride in a drinking contest, and won a luxurious lionboat for his troubles, although the loser ingraciously removed most of the ornate solid-gold trim before handing it over.

The Artificers of Mhure, who were inordinately proud of their craftsmanship, were so pleased by the clever dragonettes Tuf provided to check their plague of wing-rats that they gave him an iron-and-silver dragon-shuttle with huge bat-wings.

The knights of St. Christopher, whose resort world had been robbed of much of its charm by the depredations of huge flying saurians they called dragons (partly for effect and partly due to a lack of imagination), were similarly pleased when Tuf provided them with georges, tiny hairless simians who loved nothing better than to feast on dragon eggs. So the knights gave him a ship as well. It looked like an egg, an egg built of stone and wood. Inside the yolk were deep padded seats of oiled dragon leather, a hundred fantasical brass levers, and a stained glass mosaic where a viewscreen ought to be. The wooden walls were hung with rich hand-woven tapestries portraying great feats of chivalry. The ship didn't work, of course; the viewscreen didn't view, the brass levers did

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

nothing, and the life support systems couldn't support life. Tuf accepted it nonetheless.

And so it went, a ship here and a ship there, until his landing deck looked like an interstellar junkyard. Thus it was, when Haviland Tuf determined to make his return to S'uthlam, he had a wide variety of starships at his disposal.

He had long ago reached the conclusion that returning in the *Ark* itself would be unwise. After all, when he had left the S'uthlamese system, the Planetary Defense Flotilla had been in hot pursuit, determined to confiscate the seedship. The S'uthlamese were a highly advanced and technologically sophisticated people who would undoubtedly have made their warships faster and more dangerous in the five standard years since Tuf had last gone among them. Therefore, a scouting sortie was imperative. Fortunately, Haviland Tuf considered himself a master of disguise.

He took the *Ark* out of drive in the cold, empty darkness of interstellar space a light-year from Sulstar, and rode down to his landing deck to inspect his fleet. At length he decided upon the lionboat. It was large and swift, its star-drive and life-support systems were functional, and Karaleo was far enough removed from S'uthlam so that commerce between the two worlds was unlikely. Therefore any flaws in his imposture would most likely go unnoticed. Before he made his departure, Haviland Tuf dyed his milk-white skin a deep bronze color, covered his long hairless features with a wig that gave him a formidable red-gold beard and a wild mane, glued on fierce eyebrows, and draped his massive, paunchy frame in all manner of brightly-colored furs (synthetic) and golden chains (quasigilt, actually) until he looked the very part of a Karaleo noble. Most of his cats remained safely behind upon the *Ark*, but Dax, the black telepathic kitten with the lambent golden eyes, rode with him, snug in one cavernous pocket. He gave his ship a likely and appropriate name, stocked it with freeze-dried mushroom stew and two kegs of thick brown St. Christopher Malt, programmed its computer with several of his favorite games, and set out.

When he emerged from drive into normal space near the globe of S'uthlam and its expansive orbital docks, Tuf was hailed at once. Upon the control chamber's huge telescreen—shaped like a large eye, another interesting affectation of the Leonese—appeared the features of a small, spare man with tired eyes. "This is Spiderhome Control, Port of S'uthlam," he identified himself. "We have you, fly. ID, please."

Haviland Tuf reached out and activated his com unit. "This is *Ferocious Veldt Roarer*," he said in an even, dispassionate voice. "I wish to secure docking permission."

"What a surprise," the controller said, with bored sarcasm. "Dock four-thirty-seven. Out." His face was replaced by a schematic showing the location of a designated berth relative to the rest of the station. Then the transmission cut off.

A customs team came aboard after docking. One woman inspected his empty holds, ran a swift and cursory safety-check to make sure this odd and unlikely craft was not going to explode or melt down or otherwise damage the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

web, and checked the ship over for vermin. Her companion subjected Tuf to a lengthy inquiry as to his point of origin, destination, business on S'uthlam, and other particulars of his voyage, punching his fictitious answers into a hand computer.

They were almost finished when Dax emerged sleepily from Tuf's pocket and peered at her. "What the . . ." she said, startled. She rose so suddenly she almost dropped her computer.

The kitten—well, he was almost a cat now, but still the youngest of Tuf's pets—had long, silky hair as black as the depths of space, bright golden eyes, and a curiously indolent manner. Tuf plucked him out, cradled him with one arm, stroked him with the other. "This is Dax," he said. The S'uthlamese had a disconcerting habit of regarding all animals as vermin, and he was anxious to forestall any rash actions on the part of the customs official. "He is a pet, madam, and quite harmless."

"I know what he is," the woman said sharply. "Keep him away from me. If he goes for my throat, you're in big trouble, fly."

"Indeed," said Haviland Tuf. "I will do my best to control his ferocity."

She looked relieved. "It's only a little cat, right? What's that called, a catling?"

"Your knowledge of zoology is astute," Tuf replied.

"I don't know doodles about zoology," the customs inspector said, settling herself back into her seat. "But I watch my vidshows from time to time."

"No doubt you chanced to view an educational documentary, then," Tuf said.

"Yawn," the woman said. "Neg on that, fly, I'm more for romance and adventure vids."

"I see," said Haviland Tuf. "And one such drama featured a feline, I assume."

She nodded, and just then her colleague emerged from the hold. "All clean," the other woman said. She spotted Dax, cradled in Tuf's arms, and smiled. "A cat vermin," she said happily. "Sort of cute, isn't it?"

"Don't be fooled," the first inspector warned. "They're soft and cuddly but they can rip your lungs out in the blink of an eye."

"He looks a little small for that," her partner said.

"Ha! Remember the one in *Tuf and Mune*."

"*Tuf and Mune*," Haviland Tuf repeated, his voice without expression.

The second inspector sat down next to the first. "*The Pirate and the Portmaster*," she said.

"He was the ruthless lord of life and death, in a ship as large as the sun. She was the spider queen, torn between love and loyalty. Together they changed the world," the first said.

"You can rent it in Spiderhome if you like that sort of thing," the second told him. "It's got a cat in it."

"Indeed," said Haviland Tuf, blinking. Dax began to purr.

His berth was five kilometers out along the web, so Haviland Tuf caught a pneumatic tubetrain into port center. Spiderhome, they called it; a hollow asteroid sixteen kilometers in diameter, set square atop the great elevator at the center of the web. Its rocky surface bris-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tled with the spires, minarets, and slender towers of the great star-class hotels, thrusting out chaotically in all directions. Inside, Tuf knew, were swarming corridors and cafeterias, dormitories and warehouses, labs and computer complexes, gaming salons and hospitals and sex parlors, and distressingly large crowds of S'uthlamese and visiting offworlders. Inside also were the cozy lairs of the spinneret scientists and bureaucrats, and the office of the Portmaster.

He was jostled on every side. On the train there were no seats. He was forced to stand with a stranger's rude elbow thrust into his ribs, the cold plasteel mask of a cybertech mere millimeters from his face, and the slick carapace of some alien rubbing up against his back whenever the train slowed. When he disembarked, it was as if the car had decided to vomit out the overabundance of humanity it had ingested. The platform was swarming chaos, noise, confusion, passers-by human and nonhuman milling all about him. A short young woman with features as sharp as the blade of a stiletto laid an unwelcome hand on his furs and invited him to join her at a sex parlor. No sooner had Tuf disengaged than he faced a newsfeed reporter, equipped with third-eye camera and ingratiating smile, who said he was doing a feature on strange flies and wanted an interview.

Tuf pushed past him to a vending booth, purchased a privacy shield, and clipped it on his belt. That provided a certain minimal help. When they saw it, the S'uthlamese politely averted their eyes, in keeping with his wishes, and he was free to proceed through the throngs more or less unmolested.

His first stop was a vidplex. He engaged a private room, with couch, ordered up a bulb of watery S'uthlamese beer, and rented a copy of *Tuf and Mune*.

His second stop was the Portmaster's office. "Sir," he said to the man behind the reception console, "a query, if you will. Does Tolly Mune yet serve as Portmaster of S'uthlam?"

The secretary looked him up and down and sighed. "Flies," he said, sighing. "Of course. Who else?"

"Who else indeed," said Haviland Tuf. "It is imperative that I meet with her at once."

"Is it now? You and a thousand others. Name?"

"I am named Weemowet, a traveler out of Karaleo, master of the *Fierce Veldt Roarer*."

The secretary grimaced and entered that into the console, then slouched back on his floater chair, waiting. Finally he shook his head. "Sorry, Weemowet," he said. "Ma's busy and her computer's never heard of you, your ship, or your planet. I can get you an appointment in about a week, if you'll state your business."

"This is unsatisfactory. My business is of a personal nature, and I would prefer to see the Portmaster immediately."

The secretary shrugged. "Defecate or evacuate the chamber, fly. Best we can do."

Haviland Tuf reflected a moment. Then he reached up, grasped the fringe of his mane, and pulled. It made a ripping sound as it came off his face. "Observe!" he said. "I am not truly Weemowet. I am Haviland Tuf in dis-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

guise." He draped his mane and beard over the top of the console.

"Haviland Tuf?" the secretary said.

"Correct."

The man laughed. "I saw that vidshow, fly. If you're Tuf, I'm Stephan Cobalt Northstar."

"Stephan Cobalt Northstar has been dead for more than a millennium. Nonetheless, I am Haviland Tuf."

"You don't look a thing like him," the secretary said.

"I am incognito, disguised as a Leonese noble."

"Oh, right. I forgot."

"Your memory is short. Will you tell Portmaster Mune that Haviland Tuf has returned to S'uthlam and wishes to speak with her at once?"

"No," the man said bluntly, "but I'll be sure to tell all my friends tonight at the orgy."

"I have the sum of some sixteen million five hundred thousand standards which I wish to pay over to her," Tuf said.

"Sixteen million five hundred thousand standards?" the secretary said, impressed. "That's a lot of money."

"You have a keen perception of the obvious," Tuf said evenly. "I have found ecological engineering to be quite a lucrative profession."

"Good for you," the man said. He leaned forward. "Well, Tuf or Weemowet or whoever you are, this has all been very droll, but I have work to do. If you don't pick up your hair and scuttle out of my sight in the next few seconds, I'm going to have to call security." He was about to expand on that theme when his console buzzed at him. "Yes?" he said into his headset, frowning. "Ah, yes. Sure, Ma. Well, big, very big, two and a half meters tall, gut on him that's almost obscene. Hmmmm. No, lots of hair, or at least he did before he yanked it off and dumped it on my console. No. Says he's in disguise. Yes. Says he's got millions of standards for you."

"Sixteen million five hundred thousand," Tuf said with some precision.

The secretary swallowed. "Certainly. Right now, Ma." He broke the connection and looked up at Tuf with astonishment. "She wants to see you." He pointed. "Through that door. Careful, her office is zero-g."

"I am aware of the Portmaster's aversion to gravity," said Haviland Tuf. He gathered up his discarded mane, tucked it under one arm, and moved with stiff dignity toward the indicated door, which slid open at his approach.

She was waiting in the inner office, floating in the center of the clutter, her legs crossed, her long silver-and-iron hair moving lazily about her lean, open, homely face like a wreath of smoke. "So you came back," she said when Tuf swam into view.

Haviland Tuf was uncomfortable in zero-g. He pulled himself to her visitor's chair, securely bolted to what should have been the floor, and strapped himself in. He folded his hands neatly atop the great curve of his stomach. His mane, abandoned, drifted about on the air currents. "Your secretary refused to relay my messages," he said. "How did you come to suspect that it was me?"

She grinned. "Who else would call his ship *Ferocious Veldt Roarer*?" she said. "Besides, it's been five years al-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

most to the day. I had a feeling you'd be the punctual sort, Tuf."

"I see," said Haviland Tuf. With deliberate dignity, he reached inside his synthafurs, broke the sealseam on the inner pocket, and extracted a vinyl wallet lined with crystal datachips in tiny pouches. "Herewith, madam, I am most pleased to tender you the sum of sixteen million five hundred thousand standards, in payment of the first half of my debt to the Port of S'uthlam for the restoration and refitting of the *Ark*. You will find the funds secure in appropriate financial depositories on Osiris, ShanDellor, Old Poseidon, Ptola, Lyss, and New Budapest. These chips will permit access."

"Thanks," she said. She took the wallet, flipped it open, glanced at it briefly, and let it loose. It floated up toward the mane. "Somehow I knew you'd find the standards, Tuf."

"Your faith in my business acumen is reassuring," said Haviland Tuf. "Now, concerning this vidshow."

"*Tuf and Mune*? You've seen it, then?"

"Indeed," said Tuf.

"Goddamn," Tolly Mune said, grinning crookedly. "So what'd you think, Tuf?"

"I am forced to admit that it evoked a certain perverse fascination in me, for obvious reasons. The idea of such a drama has an undeniable appeal to my vanity, but the execution left much to be desired."

Tolly Mune laughed. "What bothers you the most?"

Tuf raised a single long finger. "In a word, inaccuracy."

She nodded. "Well, the vidshow Tuf masses about half what you do, I'd say, and his face is a lot more mobile, and his speech wasn't half as stilted, and he had a spinneret's musculature and an acrobat's coordination, but they *did* shave his head in the interests of authenticity."

"He wore a mustache," said Haviland Tuf. "I do not."

"They thought it looked roguish. Then again, look what they did to me. I don't mind that they took fifty years off my age, and I don't mind that they enhanced my face until I looked like a Vandeeni dream-princess, but those goddamned *breasts!*"

"No doubt they wished to emphasize the certainty of your mammalian evolution," said Tuf. "These might be put down as minor alterations in the interests of presenting a more aesthetic entertainment, but I regard the wanton liberties taken with my opinions and philosophies to be a far more serious matter. In particular, I object to my final speech, wherein I opine that the genius of evolving humanity can and will solve all problems, and that eco-engineering has freed the S'uthlamese to multiply without fear or limit, and thus evolve to greatness and ultimate godhood. This is in utter contradiction to the actual views I expressed to you at the time, Portmaster Mune. If you will recall our conversations, I told you distinctly that any solution to your food problem, whether technological or ecological in nature, must of necessity be only a stopgap if your people continued to practice unrestrained reproduction."

"You were the hero," Tolly Mune said. "They couldn't very well have you sound anti-life, could they?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Other flaws are also present in the narrative. Those unfortunate enough to view this fiction have received a wildly distorted view of the events of five years ago. Havoc is a harmless though spirited feline whose ancestors have been domesticated since the veritable dawn of human history, and it is my recollection that when you treacherously seized her on a legal technicality in a backhanded scheme to force me to hand over the *Ark*, she and I both tendered our surrender peacefully. At no point did she rip even a single security man apart with her claws, let alone six of them."

"She did claw the back of my hand once," said Tolly Mune. "Anything else?"

"I have nothing but approbation for the policies and conduct of Josen Rael and the High Council of S'uthlam," Tuf said. "It is true that they, and particularly First Councilor Rael, behaved in an unethical and unscrupulous manner. Nonetheless, on their behalf, it must be said that at no point did Josen Rael subject me to torture, nor did he kill any of my cats in an effort to bend me to his will."

"He didn't sweat that much either," said Tolly Mune, "and he *never* drooled. He was actually a decent man." She sighed. "Poor Josen."

"Finally we come to the crux of the matter. Crux indeed, a strange word when one rolls it upon the tongue, but quite appropriate to this discussion. The crux, Portmaster Mune, was and is the nature of our wager. When I brought the newly salvaged *Ark* in for refitting, your High Council resolved to have her. I refused to sell, and as you had no legal pretext for seizing the ship, you confiscated Havoc as vermin, and threatened to destroy her unless I thumbed a transfer. Is this correct in its essentials?"

"Sounds right to me," Tolly Mune said amiably.

"We resolved the impasse with a wager. I would attempt to forestall S'uthlam's food crisis via eco-engineering, thus averting the great famine that threatened you. If I failed, the *Ark* was yours. If I succeeded, you were to return Havoc and moreover perform the refitting and repairs that I required and allow me ten standard years to pay the resulting bill."

"Right," she said.

"To my best recollection, at no point was carnal knowledge of your body included in my terms, Portmaster Mune. I would be the last to diminish the bravura you displayed in adversity, when the High Council shut down the tubes and secured all the docks. You risked your person and career, smashed through a plasteel window, flew across kilometers of stark vacuum clad only in skinthins and propelled by airjets, dodged security squads all the way, and in the end barely avoided destruction by your own Planetary Defense Flotilla as they moved against me. Even one as plain and blunt as myself must admit these acts possess a certain heroic, even romantic, quality that in ancient days might be the stuff of legends. However, the purpose of this melodramatic albeit daring voyage was to return Havoc to my custody, as per the terms of our agreement, and not to deliver up your body to my," he blinked, "lusts. Furthermore, you made it perfectly clear at that time that your actions were motivated by a sense of honor and fear of

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the corrupting influence the *Ark* might have upon your leaders. As I recall, neither physical passion nor romantic love played any part in your calculations."

Portmaster Tolly Mune grinned. "Look at us, Tuf. A damned unlikely pair of star-crossed lovers. But you've got to admit, it makes a better story."

Tuf's long face was still and expressionless. "Surely you do not defend this grossly inaccurate vidshow," he said flatly.

The Portmaster laughed again. "Defend it? Puling hell, I *wrote* it!"

Haviland Tuf blinked six times.

Before he could frame a reply, the outer door slid open and the newsfeed peeps came swarming in, a good two dozen of them, yamming and exclaiming and shouting out rude questions. In the center of each forehead, a third eye whirred and blinked.

"This way, Tuffer. Smile."

"Do you have any cats with you?"

"Will you be taking out a marriage contract, Portmaster?"

"Where's the *Ark*?"

"Let's have an embrace, hey!"

"When did you turn brown, trader?"

"Where's the mustache?"

"Any opinion on *Tuf and Mune*, Citizen Tuf?"

"How's Havoc these days?"

Strapped immobile into his chair, Haviland Tuf glanced up, down, and all around with a series of quick, precise head motions. He blinked and said nothing. The torrent of questions continued until Portmaster Tolly Mune came swimming effortlessly through the pack, pushing peeps aside with either hand, and settled down next to Tuf. She slid her arm through his and kissed him lightly on the cheek. "Puling hell," she said, "hold your goddamned bladders, he just got here." She raised a hand. "No questions, sorry. We're invoking privacy. It's been five years, after all. Give us some time to get reacquainted."

"Are you going off to the *Ark* together?" one of the more aggressive reporters asked. She was floating a half-meter in front of Tuf's face, her third eye whirring.

"Of course," said Tolly Mune. "Where else?"

It was not until the *Ferocious Veldt Roarer* was well out of the web, en route back to the *Ark*, that Haviland Tuf deigned to walk back to the cabin he had assigned to Tolly Mune. He was freshly showered, cleansed, and scrubbed, all traces of disguise removed. His long hairless face was as white and unreadable as blank paper. He wore a plain gray coverall that did little to conceal his formidable paunch, and a green duckbilled cap adorned with the golden theta of the Ecological Engineers covered his bald pate. Dax rode upon one broad shoulder.

Tolly Mune had been reclining and sipping on a bulb of St. Christopher Malt, but she grinned when he entered. "This is damn good stuff," she said. "Well now, who's that? Not Havoc."

"Havoc is safely back aboard the *Ark*, with her mate and her kittens, though in truth they can scarcely be said to be kittens any longer. The feline population of my ship has grown somewhat since my last call at S'uthlam, albeit not as precipitiously as the human population of S'uthlam is wont to grow." He

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

lowered himself stiffly into a seat. "This is Dax. While every cat is of course special, Dax might accurately be said to be extraordinary. All cats have a touch of psi, this is well known. Due to an unusual set of circumstances I encountered upon the world known as Namor, I initiated a program to enhance and expand upon this innate feline ability. Dax is the end result, madam. We share a certain rapport, and Dax is gifted with a psi ability that is far from rudimentary."

"In short," said Tolly Mune, "you cloned yourself a mindreading cat."

"Your perspicacity remains acute, Portmaster," Tuf replied. He folded his hands. "We have much to discuss. Perhaps you will be so kind as to explain why you have requested that I bring the *Ark* back to S'uthlam, why you have insisted on accompanying me, and most crucially why you have embroiled me in this strange though colorful deception, and even gone so far as to make free with my person?"

Tolly Mune sighed. "Tuf, you remember how things stood when we parted five years ago?"

"My memory is unimpaired," said Haviland Tuf.

"Good. Then you might recall that *you left me in a real puling mess.*"

"You anticipated immediate removal from your post as Portmaster, trial on charges of high treason and a sentence to a penal farm on the Larder," said Tuf. "Nonetheless, you declined my offer to provide you with free transport to another system of your choice, preferring instead to return to face imprisonment and disgrace."

"Whatever the hell I am, I'm S'uthlamese," she said. "These are my people, Tuf. Big puling fools at times, but still my goddamned people."

"Your loyalty is no doubt commendable. Since you are still Portmaster, I must assume that circumstances changed."

"I changed them," Tolly Mune said.

"Indeed."

"Had to, if I didn't want to spend the rest of my life driving a weeder-wheel through the neograss while gravity pulled me apart." She made a face. "As soon as I got back to port, security grabbed me. I'd defied the High Council, broken laws, damaged property, and helped you escape with a ship they wanted to confiscate. Damned dramatic, wouldn't you say?"

"My opinion has no bearing on the matter."

"So dramatic, in fact, that it had to be either a crime of enormous magnitude or an act of enormous heroism. Josen was sick about it. We went way back, him and me, and he wasn't a bad man really, I told you that. But he was First Councilor, he knew what he had to do. He had to try me for treason. And I'm no damned fool either, Tuf. I knew what I had to do." She leaned forward. "I wasn't that pleased by my cards either, but I had to play them or fold. To save my boney ass, I had to destroy Josen, discredit him and most of the High Council. I had to make myself a heroine and him a villain, in terms that would be perfectly clear to every goddamned drooling slackjaw in the undercity."

"I see," said Tuf. Dax was purring; the Portmaster was perfectly sincere.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Ergo the overblown melodrama that was called *Tuf and Mune*."

"I needed cals for legal costs," she said. "That was real enough, puling hell, but I used it as an excuse to sell my version of events to one of the big vidnets. I, let us say, seasoned the story a bit. They were so excited they decided to follow the newsfeed exclusive with a dramatized version. I was more than happy to provide the script. Had a collaborator, of course, but I told him what to write. Josen never understood what was happening. He wasn't as canny a pol as he thought, and his heart was never in it. Besides, I had help."

"From what source?" Tuf inquired.

"A young man named Cregor Blaxon, mostly."

"The name is unknown to me."

"He was on the High Council. Councilor for agriculture. A very crucial post, Tuf, and Blaxon was the youngest man ever to fill it. Youngest man on the Council too. You'd think he'd be satisfied, right?"

"Please do not presume to tell me my thoughts, unless you have developed psionic abilities in my absence. I would think no such thing, madam. I have found that it is almost always a mistake to assume that any human being is ever satisfied."

"Cregor Blaxon is and was a very ambitious man," Tolly Mune said. "He was part of Josen's administration, both of them were technocrats, but Blaxon aspired to the First Councilor's seat and that was where Josen Rael had planted his buttocks."

"I grasp his motivation."

"Blaxon became my ally. He was quite impressed with what you'd provided anyway. The omni-grain, the fish and that plankton, the slime-molds, all the damn mushrooms. And he saw what was happening. He used every bit of his power to cut short bio-testing and put your stuff in the field. Screamer priorities all around. Did a smash-run on any puling fool tried to slow things down. Josen Rael was too preoccupied to notice."

"The intelligent and efficient politician is a species virtually unknown in the galaxy," said Haviland Tuf. "Perhaps I might secure a scraping from Cregor Blaxon for the *Ark*'s cell library."

"You're getting ahead of me."

"The end of the story is obvious. The appearance of vanity notwithstanding, I will venture a guess that my small effort at eco-engineering was deemed a success, and that Cregor Blaxon's energetic implementation of my solutions rebounded to his credit."

"He called it Tuf's Flowering," Tolly Mune said with a certain cynical twist to the corner of her mouth. "The newsfeeds took up the term. Tuf's Flowering, a new golden age for S'uthlam. Soon we had edible fungus growing along the walls of our sewer systems. We started huge mushroom farms in every undercity. Carpets of neptune's shawl crept across the surface of our seas, and underneath your fish multiplied at an astounding rate. We planted your omni-grain instead of neo-grass and nanowheat, and the first crop gave us almost triple the caloric yield. You did one nova-class job of eco-engineering for us, Tuf."

"The compliment is noted with due appreciation," said Tuf.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Fortunately for me, the Flowering was already in full bud when *Tuf and Mune* hit the nets, long before I went to trial. Creg was extolling your brilliance to the newsfeeds daily and telling billions that our food crisis was done, finished, over." The Portmaster shrugged. "So he made you a hero, for his own reasons. Couldn't help it, if he wanted to replace Josen. And that helped make me a heroine. It all ties together in one big neat puling knot, prettiest goddamned thing you'd ever want to see. I'll spare you the details. The end of it was, Tolly Mune acquitted, restored to office in triumph, Josen Rael in disgrace, denounced by all the opinionaters, forced to resign. Half the High Council resigned with him. Cregor Blaxon became the new technocratic leader and won the elections that followed. Creg's now First Councilor. Josen, poor soul, died two years ago. And you and I have become the stuff of legends, Tuf, the most celebrated lovers since, oh, puling hell, since all those famous romantic couples from ancient times, you know, Romeo and Juliet, Samson and Delilah, Sodom and Gomorrah, Marx and Lenin."

Perched on Tuf's shoulder, Dax began to emit a low, frightened growl. Tiny claws dug through the fabric of Tuf's jumpsuit into his flesh. Haviland Tuf blinked, then reached over and stroked the kitten soothingly. "Portmaster Mune, your smile is broad and your news seems to indicate nothing but the trite yet nonetheless eternally popular happy ending, but Dax has grown alarmed, as if you seethe with turmoil beneath this placid surface. Perhaps you are omitting some crucial part of the tale."

"Just the footnote, Tuf," the Portmaster said.

"Indeed. What might that be?"

"Twenty-seven years, Tuf. Does that trip any claxons in your head?"

"Indeed. Before I embarked upon my program of ecological engineering, your projections indicated S'uthlam to be twenty-seven standard years from mass famine, given the alarming population growth and the declining food resources."

"That was five years ago," said Tolly Mune.

"Indeed."

"Twenty-seven minus five."

"Twenty-two," said Tuf. "I assume there is a point to this exercise in elementary arithmetic."

"Twenty-two years left," Portmaster Tolly Mune said. "Ah, but that was before the *Ark*, before the genius ecologist Tuf and the daring spinneret Mune fixed it all, before the miracle of the loaves and fishes, before courageous young Cregor Blaxon ushered in Tuf's Flowering."

Haviland Tuf turned his head to look at the cat on his shoulder. "I detect a certain note of sarcasm in her voice," he said to Dax.

Tolly Mune sighed, reached into a pocket, and extracted a case of crystalline data-chips. "Here you go, lover," she said. She tossed them through the air.

Tuf reached up, caught the spinning case in a large white hand, said nothing.

"Everything you need is there. Straight from the council databanks. The hard-classified files, of course. All the reports, all the projections, all the analysis, and it's for your eyes only. You

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

understand? That's why I was so puling mysterious and that's why we're heading back to the *Ark*. Creg and the High Council figured our romance made a terrific cover. Let the billions of newsfeed viewers think we're sexing up a storm. As long as their heads are full of visions of the pirate and portmaster blazing new sexual frontiers, they won't stop to ponder what we're really up to, and everything can be done quietly. We want loaves and fishes, Tuf, but this time on a covered platter, you understand? Those are my instructions."

"What is the most recent projection?" said Haviland Tuf, his voice even and expressionless.

Dax stood up, hissing in alarm and sudden fear.

Tolly Mune sipped on her beer, and slumped back deep into her chair. She closed her eyes. "Eighteen years," she said. She looked like the hundred-year-old woman she was, instead of a youngster of sixty, and her voice was infinitely weary. "Eighteen years," she repeated, "and counting."

When Tuf had first come to S'uthlam five years before, Tolly Mune had often projected the image of the *Ark* on her vidscreen while she considered the problems it had presented to her. But she had never set foot inside the ancient EEC seedship until now. She was far from unsophisticated. Having spent her life on S'uthlam, with its vast continent-wide cities, its teeming billions, its towers rising ten kays into the sky, its deep underways far below the surface, and its great orbital elevator, she was not a woman easily impressed by mere size. But there was something about the *Ark*, she thought.

She felt it from the moment of their arrival, as the great dome of the landing deck cracked open beneath them and Tuf took the *Ferocious Veldt Roarer* down into darkness and settled it among his shuttles and junked starships, upon a circular landing pad that glowed a dim blue in welcome. The dome closed over them and atmosphere was pumped back in; to fill so large a space so quickly it came with gale force, howling and sighing all around them. Finally Tuf opened their locks and preceded her down an ornate stair that slid from the lionboat's mouth like a gilded tongue. Below, a small three-wheeled cart was waiting. Tuf drove past the clutter of dead and abandoned ships, some more alien than any Tolly Mune had ever seen. He drove in silence, looking neither right nor left, Dax a limp, boneless, purring ball of fur stretched across his knees.

Tuf gave her an entire deck to herself. Hundreds of sleeping berths, computer stations, labs, accessways, sanitary stations, recreation halls, kitchens, and no tenants but her. On S'uthlam, a city-space this large would have housed a thousand people, in apartments smaller than the *Ark*'s storage closets. Tuf turned off the gravity grid on that level, since he knew she preferred zero-g.

"If you have need of me, you will find my own quarters on the top deck, under full gravity," he told her. "I intend to address all my energies to the problems of S'uthlam. I will not require your counsel or assistance. No offense is intended, Portmaster, but it has been my bitter experience that such liaisons are more trouble than they are worth and

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

serve only to distract me. If there is an answer to your most vexing quandry, I shall arrive at it soonest by my own efforts, left undisturbed. I shall program a leisurely voyage toward S'uthlam and its web; it is my hope that when we arrive I will be able to solve your difficulty."

"If you can't," she reminded him sharply, "we get the ship. Those were the terms."

"I am fully aware of this," said Haviland Tuf. "In the event you grow restive, the *Ark* offers a full spectrum of diversions, entertainments, and occupations. Feel free to avail yourself of the automated food facilities as well. The fare so provided is not equal to the meals I prepare personally, though it will acquit itself admirably when compared to typical S'uthlamese provendar, I have no doubt. Partake of as many meals as you require during the day; I will be pleased to have you join me each evening for dinner at eighteen-hundred ship's time. Kindly be punctual." And so saying, he took his leave.

The computer system that ran the great ship observed cycles of light and darkness, to simulate the passage of day and night. Tolly Mune spent her nights before a holo monitor, viewing dramas several millenia old recorded upon worlds half-legendary. Her days she spent exploring; first the deck that Tuf had ceded her, and then the rest of the ship. The more she saw and learned, the more awed and uneasy Tolly Mune became.

She sat for days in the old captain's chair on the tower bridge that Tuf had bypassed as inconvenient, watching random selections from the ancient log roll down the great vidscreen.

She walked a labyrinth of decks and corridors, found three skeletons in scattered parts of the *Ark* (only two of them human), wondered at one corridor intersection where the thick duralloy bulkheads were blistered and cracked, as if by great heat.

She spent hours in a library she discovered, touching and handling old books, some printed on thin leaves of metal or plastic, others on real paper.

She returned to the landing deck and climbed around a few of the derelict starships Tuf had there. She stood in the armory and gazed on a frightening array of weapons, some of them obsolete, some of them unrecognizable, some of them forbidden.

She wandered down the dim vastness of the central shaft that cored the ship, walked the full thirty kays of its length, her bootsteps echoing overhead, her breath coming hard by the end of her daily treks. Around her were cloning vats, growth tanks, microsurgeries, and computer stations in staggering profusion. Ninety per cent of the vats were empty, but here and there the Portmaster found life growing. She peered through dusty glass and thick, translucent fluids at dim, living shapes, shapes as small as her hand and shapes as large as a tubetrain. It made her feel cold.

In fact, the whole ship seemed chilly and somehow frightening to Tolly Mune.

The only real warmth was to be found on the tiny portion of the top deck where Haviland Tuf spent his nights and days. The long, narrow communications room he had refitted as his central control was cozy and comfortable. His quarters were crowded with worn, overstuffed furniture and an amazing assortment of bric-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a-brac accumulated in his voyagings. The smell of food and beer permeated the air here, bootsteps did not echo so, and there was light and noise and life. And cats.

Tuf's cats had free run of most of the ship, but most of them seemed to prefer to stay close to Tuf himself. He had seven now. Chaos was the lord of all he surveyed; a long-haired gray tom with imperious eyes and an indolent, dominating manner. He could most often be found sitting on top of Tuf's master console in the control chamber, his bushy tail twitching like a metronome. Havoc, the short-haired black-and-white female that Tolly Mune had once kidnapped and later risked life and career to return, had lost energy and gained weight in five years. She did not seem to recognize the Portmaster at first, but after a few days the old familiarity returned, and Havoc took up the acquaintance where it had dropped, and sometimes even accompanied Tolly on her wanderings.

Then there were Ingratitude, Doubt, Hostility, and Suspicion. "The kittens," Tuf called them, though they were really young cats now, "born of Chaos and Havoc, madam. Originally they comprised a litter of five. I left Foolishness behind on Namor."

"It's always best to leave foolishness behind," she said. "I never figured you to part with a cat, though."

"Foolishness developed an inexplicable fondness for a vexing and unpredictable young woman of Namorian origin," he said. "Since I had many cats and she had none, it seemed the appropriate gesture under the circumstances. Although the feline is a splendid and admirable creature, it remains relatively scarce in this sad modern galaxy. Thus my innate generosity and sense of duty to my fellow humans prompt me to offer cats to worlds such as Namor. A culture with cats is richer and more humane than one deprived of their unique companionship."

"Right," said Tolly Mune, smiling. Hostility was near at hand. She scooped him up carefully, stroked him. His fur was very soft. "Strange names you gave this lot."

"Perhaps more apt to human nature than to the feline," Tuf agreed. "I bestowed them on a whim."

Ingratitude, Doubt, and Suspicion were gray, like their father; Hostility was black-and-white like Havoc. Doubt was noisy and fat, Hostility was aggressive and rambunctious, Suspicion was shy and liked to hide under Tuf's chair. They liked to play together, a boisterous cat pack, and seemed to find Tolly Mune endlessly fascinating, climbing all over her whenever she paid Tuf a visit. Sometimes they turned up in the least likely places. Hostility landed on her back one day as she ascended an escalator and the surprise left her breathless and shocked. She grew accustomed to having Doubt in her lap during meals, begging slivers of food.

S'uthlam had no room for pets, no tolerance for any living thing that was not a necessary part of the food chain. The offworld animals who passed through the web were vermin, nothing more, or so Tolly Mune had believed for most of her life. But five years ago her enforced cohabitation with Havoc had changed that attitude, and now she found that a certain fondness remained.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Chaos, Havoc, and all four of the kittens; she soon found herself smiling at all of them, playing with them, feeding them, petting them, and laughing at their idiosyncracies.

And then there was the seventh cat: Dax.

Dax, with his fur the color of night and eyes like small golden lamps. Dax, the single most lethargic vermin she had ever seen, who preferred being carried to walking. Dax, who peered from Tuf's pocket, or out from beneath his cap, who sat on his knees or rode on his shoulder. Dax, who never played with the older kittens, who seldom made a sound, whose golden glance could somehow displace even huge, lordly Chaos from a chair both of them coveted. The black kitten was with Tuf constantly. "Your familiar," Tolly Mune said to him one mealtime, after she had been aboard for nearly twenty days. She pointed a knife. "That makes you a . . . what was the term?"

"There were several," Tuf said. "Witch, wizard, warlock. The nomenclature derives from Old Earth myth, I believe."

"It fits," said Tolly Mune. "Sometimes I feel this ship is haunted."

"This suggests why it is wiser to rely upon intellect rather than feelings, Portmaster. Accept my assurance that if ghosts or other supernatural entities did in fact exist, they would be represented aboard the *Ark* by cell samples, in order that they might be cloned. I have never encountered such samples. My stock in trade does include species sometimes referred to as hooded draculas, windwraiths, lycanthropes, vampires, garghouls, witchweed, and other such terms, but these are not the genuine mythic articles, I fear."

Tolly Mune smiled. "Good thing."

"More wine, perhaps? It is an excellent Rhiannese vintage."

"That's one good idea," she said, splashing some into her glass. She still would have preferred a squeeze bulb; open liquids were sneaky things always waiting to spill. "My throat's dry anyway. You don't need monsters, Tuf. This ship of yours could destroy worlds as it is."

"This is obvious," said Tuf. "Equally obvious, it can save worlds."

"Like ours? You have a second miracle up your sleeve, Tuf?"

"Alas, miracles are as mythic as ghosts and goblins, and there is nothing up my sleeves but my arms. However, the human intellect is still capable of certain less-than-miraculous breakthroughs." He rose slowly to his full height. "If you are quite finished with your pop-onion pie and wine, perhaps you will accompany me to the computer room. I have applied myself diligently to your problems and have arrived at a few conclusions."

Tolly Mune got up quickly. "Lead on," she said.

"Note," said Haviland Tuf. He pressed a command key; a projection flashed upon one of the screens.

"What's this?" asked Tolly Mune.

"The projection I made five years ago," he said. Dax hopped into his lap; Tuf reached out and stroked the black kitten. "The parameters used were the then-current S'uthlamese population figures and the projected population growth, as of that time. My analysis

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

indicated that the additional food resources introduced into your society by means of what Cregor Blaxon was so kind as to dub Tuf's Flowering should have given you at minimum ninety-four standard years before the specter of planetary famine again threatened S'uthlam."

"Well, that's one goddamned projection that wasn't worth a pot of vermin," Tolly Mune said bluntly.

Tuf raised a finger. "A more volatile man than myself might take umbrage at the implication that his analysis was defective. Fortunately I am of a cool and tolerant nature. Nonetheless, you are most incorrect, Portmaster Mune. My projections were as accurate as they could possibly have been."

"Then you're saying that we *don't* have starvation and collapse staring down at us eighteen years in the future? That we've got, what, almost a century?" She shook her head. "I'd like to believe that, but—."

"I said no such thing, Portmaster. Within its prescribed margin of error, the latest S'uthlamese projection also appears to be quite accurate insofar as I have been able to determine.

"Both projections can't be correct," she said. "That's impossible, Tuf."

"You are wrong, madam. During the intervening five years, the parameters changed. Attend." He reached out and depressed another button. A new line, rising sharply, curved across the screen. "This represents the present curve of population increase on S'uthlam. Note how it climbs, Portmaster. An astonishing rate of ascent. Were I of a poetic turn of mind, I might even say it soars. Fortunately I am not so afflicted. I am a blunt man who speaks bluntly." He raised a finger. "Before we can hope to rectify your situation, it is necessary to understand that situation and how it came to be. Here is all clarity. Five years ago, I employed the resources of the *Ark*, and, if I may be so bold as to put my accustomed modesty aside, tendered to you extraordinarily efficient service. The S'uthlamese wasted no time in undoing everything I had done. Let me put it succinctly, Portmaster. No sooner had the Flowering taken root, so to speak, than your people rushed back to their private chambers, unleased their carnal lusts and parental urges, and began reproducing faster than ever. Mean family size is greater now than five years ago, by .0072 persons, and your average citizen becomes a parent sooner by .0102 years. Small changes, you may protest, but when factored into the enormous base population of your world, and modified by all other relevant parameters, they make a dramatic difference. The difference, to be precise, between ninety-four years and eighteen."

Tolly Mune stared at the lines crossing upon the screen. "Puling hell," she muttered. "I should have figured, goddamn it. This sort of information is classified, for obvious reasons, but I should have known." Her hands clenched into fists. "Goddamn it to hell," she said. "Creg made such a newsfeed carnival out of the goddamned Flowering, no wonder this is happening. Why should anyone refrain from birthing, the food problem had been solved, right? The goddamned First Councilor said so. Good times had arrived, right? All the damned zeros had turned out to be pul-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ing anti-life alarmists once more, the technocrats had worked another miracle, how could anyone doubt that they'd do it again, and again, and again? Oh, yes. So be a good church member, have more kids, help humanity evolve to godhood and defeat entropy. Hey, why not?" She made a disgusted noise. "Tuf, why are people such puling idiots?"

"This quandary is even more perplexing than the dilemma that is S'uthlam," said Tuf, "and I fear I am not equipped to answer it. So long as you are engaged in the division of blame, you might also assign some to yourself, Portmaster. Whatever misleading impression might have been given by First Councilor Cregor Blaxon was most certainly confirmed in the popular mind by that unfortunate final oration delivered by my impersonator in *Tuf and Mune*."

"All right, damn it. Guilty, I'm guilty, I helped gnarl it up. That's past now. The question is, what can we do about it?"

"You can do little, I fear," said Haviland Tuf, his face expressionless.

"And you? You worked the loaves and fishes miracle once. Can we get a second helping, Tuf?"

Haviland Tuf blinked. "I am a more experienced ecological engineer now than when I first attempted to deal with the problem of S'uthlam. I am more familiar with the full range of species contained within the *Ark*'s cell library, and the effect of each upon individual eco-systems. I have even increased my stock in trade to a certain extent during the course of my travels hither and yon. Indeed, I can be of service." He cleared the screens and folded his hands atop his stomach. "There will be a price."

"A price? We paid your damn price, remember? My spinnerets fixed your goddamned ship."

"Indeed they did, even as I repaired your ecology. I do not require any further repairs or refitting of the *Ark* at this time. You, however, appear to have damaged your ecology once again, so you have further need of my services. It strikes me as only equitable that I be compensated for my efforts. I have many operating expenses, chief among which is my still-formidable debt to the Port of S'uthlam. By dint of exhausting and unremitting labor on numerous scattered worlds, I have raised the first half of the thirty-three million standards you assessed me, but an equal amount remains to be paid, and I have but five additional years to earn it. How can I say if this will be possible? Perhaps the next dozen worlds on which I call will have ecologies without blemish, or will be so impoverished that I will be forced to grant them severe discounts if I am to serve them at all. Day and night the size of my debt preys upon my mind, often interfering with the clarity and precision of my thoughts and thus making me less effective at my profession. Indeed, I have a sudden hunch that when wrestling with a challenge of the vast magnitude of that posed by S'uthlam, my performance might be far superior were my mind to be clear and untroubled."

Tolly Mune had expected something like this. She had told Creg as much, and he'd given her limited budgetary discretion. Still, she managed a frown. "How much do you want, Tuf?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"The sum of ten million standards leaps to mind," he said. "Being a round number, it might be deducted from my bill easily without posing any knotty problems of arithmetic."

"Too damn much," she said. "Maybe I could get the High Council to agree to lop off, say, two million. No more."

"Let us compromise on nine million," said Tuf. A long finger scratched Dax behind a small black ear; the cat silently turned its golden eyes on Tolly Mune.

"Nine isn't much of a compromise between ten and two," she said drily.

"I am a better ecological engineer than mathematician," said Tuf. "Perhaps eight?"

"Four. No more. Cregor will implode on me as it is."

Tuf fixed her with an unblinking stare, and said nothing. His face was cool and still and impassive.

"Four and a half million," she said under the weight of his gaze. She felt Dax staring too, and suddenly wondered if that damn cat was reading her mind. She pointed. "Damn it," she said, "that little black bastard knows just how high I'm authorized to go, doesn't he?"

"An interesting notion," said Tuf. "Seven million might be acceptable to me. I am in a generous mood."

"Five and one-half," she snapped. What was the use?

Dax began to purr loudly.

"Leaving a net principle of eleven million standards to be paid within five years," said Tuf. "Accepted, Portmaster Mune, with one additional proviso."

"What's that?" she said suspiciously.

"I will present my solution to First Councilor Cregor Blaxon and yourself at a public conference, to be attended by newsfeed peeps from all of your vidnets, and broadcast live over the entirety of S'uthlam."

Tolly Mune laughed aloud. "Incredible," she said. "Creg will never agree. You can forget that idea."

Haviland Tuf sat petting Dax, and said nothing.

"Tuf, you don't understand the difficulties. The situation is too damned volatile. You'll have to give on this one."

The silence lingered.

"Puling hell," she swore. "Tell you what, write down what you want to say, and let us look it over. If you avoid anything that might stir up problems, I suppose we can give you access."

"I prefer that my remarks be spontaneous," Tuf said.

"Maybe we can record the conference and broadcast it after editing," she said.

Haviland Tuf kept silent. Dax stared at her unblinking.

Tolly Mune looked deep into those knowing golden eyes, and sighed. "You win," she said. "Cregor will be furious, but I'm a puling heroine and you're a returning conquerer, I suppose I can cram it down his gullet. But why, Tuf?"

"A whim," said Haviland Tuf. "I am often taken by such fancies. Perhaps I wish to savor a moment in the light of publicity and enjoy my role as savior. Perhaps I wish to show the S'uthlamese billions that I do not wear a mustache."

"I'll believe in goblins and ghouls before I pay one standard for that load of ore," said Tolly Mune. "Tuf, there are reasons why our population size and

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the gravity of the food crisis are kept secret, you know. Policy reasons. Now, you wouldn't be thinking about, ah, opening that particular box of vermin, would you?"

"An interesting concept," Tuf said, blinking, his face blank and noncommittal.

Dax purred.

"Unaccustomed as I am to public speaking and the unflattering glare of publicity," Haviland Tuf began, "I felt it incumbent upon myself to come before you and explain certain things."

He stood before a four-meter square telescreen in the largest hall in Spiderhome, with a seating capacity for almost a thousand. The room was packed; newsfeed reporters were jammed in elbow-to-elbow up front, twenty rows of them, a tiny miniaturized camera in the center of each forehead busily recording the scene. Further back were the curious who had come to watch: spinnerets of all ages, sexes, and professions, from cybertechs and bureaucrats to eroticists and poets, wealthy groundworms who had come up the elevator for the show, flies from distant systems passing through the web. On the platform with Tuf were Portmaster Tolly Mune and First Councilor Cregor Blaxon. Blaxon's smile looked forced; perhaps he was recalling how the newsfeed peeps had all captured the long, awkward moment when Tuf blinked at his proferred hand. For that matter, Tolly Mune looked a bit uneasy.

Haviland Tuf, however, looked impressive; looming over every man and woman in the hall, his gray vinyl greatcoat sweeping the floor, the sigil of the EEC upon his green billed cap.

"First," he said, "permit me to point out that I do not wear a mustache." The statement provoked general laughter. "Nor have your esteemed Portmaster and myself ever united in physical congress, vidshows notwithstanding, though I have no reason to doubt that she is a skillful practitioner of the erotic arts whose favors would be held in high esteem by any who enjoy that sort of diversion." The horde of newspeeps, like one clamorous hundred-headed beast, turned and fixed their third eyes upon Tolly Mune. The Portmaster was slumped deep in her seat, with a hand rubbing her temples. Her sigh was audible as far as the fourth row.

"These points of information are minor in nature," said Tuf, "and are advanced solely in the interest of veracity. The major reason that I have insisted upon this gathering is professional rather than personal, however. I have no doubt that each of you listening to this newsfeed is aware of the phenomenon that your High Council called Tuf's Flowering."

Cregor Blaxon smiled and nodded his head.

"I must presume, however, that you are unaware of the imminence of what I will be so bold as to call S'uthlam's Wilting."

The First Councillor's smile wilted too, and Portmaster Tolly Mune winced. The newspeeps swung back to Tuf en masse.

"You are indeed fortunate that I am a man who honors his debts and obligations, since my timely return to S'uthlam has allowed me to intervene once more in your behalf. Your leaders have been less than frank with you. But

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

for the aid I am about to render you, your world would face starvation within the short span of eighteen standard years."

A moment of stunned silence occurred. Then a small riot began in the rear of the hall. Several people were forcibly ejected. Tuf paid the incident no mind.

"On my last visit, the program of ecological engineering I initiated produced dramatic increases in your food supply, through relatively conventional means, to wit the introduction of new plant and animal species designed to maximize your agricultural productivity without seriously altering your ecology. Further efforts in this direction are undoubtedly possible, but I fear that the point of diminishing returns has long been passed, and such schemes would avail you little. Accordingly, this time I have accepted as fundamental the need to make radical alterations in your ecosystem and food chain. Some of you will find my suggestions unpleasant. I assure you that the other options you face, to wit famine, plague, and war, are even more disagreeable. The choice, of course, remains yours, and I would not dream of making it for you."

The room was as cold as a cryonic storage facility, and deathly silent but for the whirring of the massed third eyes. Haviland Tuf raised a finger. "First," he said. Behind him an image filled the telescreen, broadcast directly from the *Ark*'s computers: the image of some swollen monstrosity as big as a hill, its skin oily and glistening, its bulk shimmering like opaque pink gelatin. "The meatbeast," said Haviland Tuf. "A significant portion of your agricultural land is devoted to the raising of herds of meat animals of various sorts, whose flesh is the delectation of a very small wealthy minority of S'uthlamese who can afford such luxury and enjoy eating cooked animal matter. This is extremely inefficient. These beasts consume far more calories than they yield after slaughter, and being themselves the product of natural evolution much of their body mass is inedible. I therefore suggest you eliminate these species from your world's ecosystem immediately.

"The meatbeasts, as depicted, are among the most notable triumphs of genetic tailoring; except for a small nucleus, these creatures are ever-replicating masses of undifferentiated cells, with no body mass wasted on non-essentials like sensory organs, nerves, or mobility. If one chose to employ metaphor, one might liken them to giant edible cancers. The flesh of the meatbeast contains all essential human nutrients and is high in protein, vitamins, and minerals. One adult meatbeast, growing in the basement of a S'uthlamese apartment tower, will yield as much edible flesh in a standard year as two of your present herds, and the grasslands now employed to raise these herds would be freed for agricultural cultivation."

"How do the damn things taste?" someone shouted out from the back of the room.

Haviland Tuf's head moved slightly and he looked directly at the speaker. "As I am not myself an eater of animal flesh, I cannot answer that question from personal authority. I imagine, however, that meatbeast would taste

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

very good to any starving man." He raised a hand, palm outward. "Let us proceed," he said, and the picture behind him changed. Now the telescreen showed an endless flat plain under a double sun. The plain was filled from horizon to horizon with plants, ugly looking things as tall as Tuf himself, their stalks and leaves an oily black, their heads drooping beneath the weight of swollen whitish pods that dripped a pale thick fluid.

"These, for reasons unknown to me, are called jersee-pods," said Tuf. "Five years ago, I gave you omni-grain, whose caloric yield per square meter is dramatically higher than that of nanowheat, neograss, and the other grains you had hitherto been planting. I note that you have sowed omni-grain extensively and reaped the benefits thereof. I also note that you have continued to plant nanowheat, neograss, spicepods, smackles, and numerous other types of fruit and vegetables, no doubt for the sake of variety and culinary pleasure. This must cease. Culinary variety is a luxury the S'uthlamese can no longer afford. Caloric efficiency alone must henceforth be your byword. Every square meter of agricultural land on S'uthlam and your so-called Larder asteroids must immediately be turned over to jersee-pods."

"What kind of gunk is that dripping there?" someone called.

"Is that thing a fruit or a vegetable?" a newspeep demanded to know.

"Can you make bread from it?" another asked.

"The jersee-pod," said Tuf, "is inedible."

A sudden clamorous uproar swept over the room, as a hundred people shouted and waved and threw questions and began speeches.

Haviland Tuf waited calmly until there was silence. "Each year," he said, "as your First Councilor can tell you were he only so inclined, your agricultural lands yield an ever-diminishing percentage of the caloric needs of the swelling S'uthlamese population, the difference being made up by increased production from your food factories, where petrochemicals are processed into nutritious wafers and paste and clever synthetic edibles. Alas, however, petroleum is a non-renewable resource, and you are running out. This process may be delayed, but ultimately it is inexorable. No doubt you are importing some from other worlds, but that interstellar pipeline can yield you only so much. Five years ago, I introduced into your seas a plankton of a variety called neptune's shawl, colonies of which now creep up your beaches and float upon the waves above your continental shelves. When dead and decayed, neptune's shawl can serve as a substitute for petrochemicals in your food factories.

"Jersee-pods might be looked upon as a non-aquatic analogue to neptune's shawl. The pods produce a fluid with certain bio-chemical similarities to raw crude oil. It is similar enough so that your food factories, after a minimal retooling easily accomplished by a world of your undoubted technological expertise, can make efficient use of it for processing into foodstuffs. Yet I must stress that you cannot simply plant these pods here and there as a supplement to your present crops; for maximum bene-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

fit, they must be planted universally, entirely supplanting the omni-grain, neograss, and other flora on which you have become accustomed to rely for provendar."

A slender woman in the back stood up on her chair to be seen above the throng. "Tuf, who are you to tell us that we have to give up real food?" she screamed, anger in her tone.

"I, madam? I am but a humble ecological engineer engaged in the practice of his profession. It is not for me to make your decisions. My task, so obviously thankless, consists of presenting you with the facts and suggesting certain possible remedies which might be efficacious, however unpleasant. Thereafter, the government and people of S'uthlam must make the ultimate determination as to what course you follow." The audience was getting unruly again. Tuf raised a finger. "Quiet, please. I will soon conclude my presentation."

The picture on the telescreen changed once more. "Certain species and ecological strategies that I introduced five years ago, when first employed by S'uthlam, can and should remain in place. The mushroom and fungus farms beneath your undercities should be maintained and expanded. I have several new varieties of fungus to demonstrate to you. More efficient methods of farming the seas are certainly possible, methods which include use of the ocean floor as well as its watery ceiling. The growth of neptune's shawl can be stimulated and encouraged until it covers every square meter of S'uthlam's salt water surface. The snow-oats and tunnel-tubers you have in place remain optimal food species for your frigid arctic regions. Your deserts have been made to bloom, your swamps have been drained and made productive. All that might be done on land or on sea is being attempted. There remains only the air. I therefore propose the introduction of a complete living ecosystem into your upper atmosphere.

"Behind me, upon the screen, you see the final link in this new food-chain I propose to forge for you. This huge dark creature with the black triangular wings is a Claremontine wind-rider, also called the *ororo*, a distant analogue to better-known species such as the black banshee of High Kavalaan and the lash-tail manta of Hemador. It is a predator of the upper atmosphere, a glider and hunter, born aloft, a creature of the winds that lives and dies in flight, never touching land or sea. Indeed, once having landed, such wind-riders soon perish, as it impossible for them to go aloft again. On Claremont, the species is small and lightweight, its flesh reported tough and leathery. It consumes any birds with the misfortune to venture into the altitudes it hunts, and also several varieties of airborne microorganisms, flying fungus, and windborne slime-molds that I also propose to introduce into your upper atmosphere. I have produced a genetically tailored wind-rider for S'uthlam, with a wing-span of some twenty meters, the ability to descend almost to treetop level, and nearly six times the body mass of the original. A small hydrogen sac behind the sensory organs will enable the beast to maintain flight despite this greater body weight. With your aircars and fliers, you will have no difficulty hunting and killing the wind-riders, and you will find them an excellent source of protein.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LICENSED TO UNI.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"In the interests of full and complete honesty, I must add that this ecological modification will not be without cost. The microorganisms, fungus, and slime-molds will reproduce very quickly in your skies, having no natural enemies. The upper stories of your taller residential towers will be covered with mold and fungus, and more frequent cleaning will be required. Most of the native S'uthlamese birds and those species you brought to this world from Tara and Old Earth will die out, displaced by this new aerial ecosystem. Ultimately, the skies themselves will darken, you will receive significantly less sunlight, and your climate will undergo a permanent change. I do not project this happening for some three hundred years, however. Since you face disaster in a far shorter time if nothing is done, I continue to recommend the course of action I have outlined."

The newsfeed reporters leaped to their feet and began shouting questions. Tolly Mune was slumped and scowling. First Councilor Cregor Blaxon was sitting quite still, staring straight ahead with a fixed smile on his sharp, thin face, his eyes glassy.

"A moment, if you will," Haviland Tuf said to the turmoil. "I am about to conclude. You have heard my recommendations and seen the species with which I intend to resdesign your ecology. Now, attend. Assuming your High Council does indeed opt to deploy the meatbeast, the jersee-pod, and the ororo in the ways that I have outlined, the *Ark*'s computers project a significant improvement in your food crisis. Observe."

All eyes went to the telescreen. Even Tolly Mune craned her head around, and First Councilor Cregor Blaxon, smile still firmly in place, rose from his seat and faced the screen boldly, his thumbs hooked into his pockets. A grid flashed into place, a red line chased a green line across the display, dates lined up along one axis, population figures along the other.

The noise died.

The silence lingered.

Even way to the back, they heard Cregor Blaxon when he cleared his throat. "Ah, Tuf," he said, "this must be wrong."

"Sir," said Haviland Tuf, "I assure you, it is not."

"It's, ah, the before, isn't it? Not the after." He pointed. "I mean, look, all that eco-engineering, growing nothing but these pods, our seas covered with neptune's shawl, the skies growing darker with flying food, meat-mountains in every cellar."

"Meatbeasts," Tuf corrected, "although I concede that 'meat mountains' has a certain flair. You have a gift for colorful language and memorable terminology, First Councilor."

"All this," Blaxon said doggedly, "is pretty radical, Tuf. We have a right to expect radical improvement, I'd say."

A few loyalists began cheering him on.

"But this," the First Councilor concluded, "this projection says, ah, maybe I'm reading it wrong."

"First Councilor," said Haviland Tuf, "and people of S'uthlam, you are reading it correctly. If you adopt every one of my suggestions, you will indeed postpone your day of catastrophic reckoning. Postpone, sir, not forestall. You

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

will have mass famine in eighteen years, as per your current projection, or in one hundred nine, as this projection indicates, but you will most certainly have mass famine." He raised a finger. "The only true and permanent solution is to be found not aboard my *Ark*, but in the minds and loins of each individual S'uthlamese citizen. You must practice restraint and implement immediate birth control. You must stop your indiscriminate procreation at once!"

"Oh, no," groaned Tolly Mune. But she had seen it coming, and she was on her feet, moving toward him and shouting for a security cordon, well before all hell broke loose.

"Rescuing you is getting to be a puling habit," Tolly Mune said, much later, when they had returned to the safety of Tuf's shuttle *Phoenix*, in its berth way out along spur six. Two whole squads of security, armed with nerveguns and tanglers, stood outside the ship, keeping the growing and unruly crowd at bay. "You have any beer?" She asked. "I could use one, puling hell." It had been a harrowing run back to the ship, even with guards flanking them to either side. Tuf ran with a strange awkward lope, but he had suprising speed, she had to admit. "How are you doing, anyway?" she asked him.

"A thorough scrubbing has removed most of the spittle from my person," Haviland Tuf said, folding himself into his seat with dignity. "You will find beer in the refrigerated compartment under the gaming board. Make free with it, if you will." Dax began to scale Tuf's leg, digging tiny claws into the fabric of the pale blue jumpsuit into which he had changed. Tuf reached down with a large hand and helped him up. "In the future," he said to the cat, "you shall accompany me at all times, so that I will have ample warning of the onset of such demonstrations."

"You'd have had ample goddamned warning this time," said Tolly Mune, pulling out a beer, "if you'd told me that you intended to condemn our beliefs, our church, and our whole puling way of life. Did you expect they'd give you a medal?"

"A rousing hand of applause would have been sufficient."

"I warned you a long time ago, Tuf, on S'uthlam it's not popular to be anti-life."

"I decline to be thus labeled," said Tuf. "I stand squarely in favor of life. Indeed, daily I create life in my cloning vats. I have a decided personal aversion to death, I find entropy distasteful, and if invited to the heat death of the universe, I would most certainly make other plans." He raised a finger. "Nonetheless, Portmaster Mune, I said what had to be said. Unlimited procreation as taught by your Church of Life Evolving and practiced by the majority of S'uthlamese, yourself and your fellow zeros excluded, is irresponsible and foolish, producing as it does a geometric population increase that will most assuredly pull down your proud civilization."

"Haviland Tuf, prophet of doom," the Portmaster said with a sigh. "They liked you better as a rogue ecologist and a lover."

"Everywhere I visit, I find heroes to be an endangered species. Perhaps I am

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

more aesthetically pleasing when mouthing reassuring falsehoods through a filter of facial hair in melodramatic vidshows reeking of false optimism and post-coital complacency. This is a symptom of the great S'uthlamese affliction, your blind preference for things as you would have them rather than as they are. It is time that your world looked upon naked truth, be it my hairless face or the near certainty of famine in your future."

Tolly Mune swallowed some beer and stared at him. "Tuf," she said, "you remember what I said five years ago?"

"As I recall, you said a great many things."

"At the end," she said impatiently, "when I decided to help you escape with the *Ark* instead of helping Josen Rael take it from you. You asked me why, and I explained my reasons."

"You said," Tuf stated, "that power corrupts, that absolute power corrupts absolutely, that the *Ark* had already corrupted First Councilor Josen Rael and his associates, and that I was better fitted to retain possession of the seedship because I was an incorruptible man."

She gave him a wan smile. "Not quite, Tuf. I said I didn't think there was such a thing as an incorruptible man, but if there was, you were the item."

"Indeed," said Tuf, stroking Dax. "I stand corrected."

"Now you're making me wonder," she said. "You know what you just did, back there? For starts, you toppled another government. Creg can't survive this, you told the whole world he's a liar. Maybe that's fair enough; you made him, now you unmade him. First Councilors don't seem to last long when you come calling, do they? But never mind that. You also told, oh, some thirty-odd billion members of the Church of Life Evolving that their most deeply held religious beliefs are so much bladder bloat. You as much as said that the entire basis of the technocratic philosophy that has dominated council policy for centuries is mistaken. We'll be lucky if the next damned election doesn't bring the expansionists back in, and if that happens, it means war. Vandeen and Jazbo and the other allies will not tolerate another expansionist government. You probably ruined me too. Again. Unless I'm even faster on my goddamned feet than I was last time around. Instead of a star-crossed lover I'm now the sort of gnarly old bureaucrat who likes to lie about her sexual escapades, and I helped Citizen Anti-Life too." She sighed. "You seem determined to see me in disgrace. But that's nothing, Tuf, I can take care of myself; the main thing is, you took it upon yourself to dictate policy to forty-plus billion people, with only the vaguest conception of the consequences. By what authority? Who gave you the right?"

"I would maintain that any human has the right to speak the truth."

"And the right to demand a worldwide all-net newsfeed to speak it on, where did that puling right come from?" she said. "There are several million people on S'uthlam who belong to the zero faction, me included. You didn't say much that we haven't said for years. You just said it louder."

"I am aware of this. It is my hope that the words spoken this evening, no

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

matter how bitterly they were received, will ultimately have a beneficial effect upon S'uthlamese politics and society. Perhaps Cregor Blaxon and his technocrats will grasp the truth that no true salvation can be found in what he calls Tuf's Flowering and what you once referred to as the miracle of loaves and fishes. Perhaps from this point on, policies and opinions will be changed. Perhaps your zero faction may even triumph in the next election."

Tolly Mune scowled. "That's damned unlikely, and you should know it. And even if the zero faction won, the question arises as to what the hell we could do." She leaned forward. "Would we have the right to *enforce* population control? I wonder. Never mind about that, though, my point is that you don't have any damned monopoly on truth. Any zero could have given your damned speech. Hell, half the damned technocrats know what the ledger looks like. Creg's no fool. Neither was poor Josen. What allowed you to do that was *power*, Tuf. The power of the *Ark*. The help you can give us, or withhold, as you choose."

"Indeed," said Tuf. He blinked. "I cannot take issue with you. The sad truth of history has always been that the unreasoning masses follow the powerful, and not the wise."

"And which are you, Tuf?"

"I am but a humble—"

"Yes, yes," she snapped, "I know, a goddamned humble ecological engineer. A humble ecological engineer who has taken it on himself to play prophet. A humble ecological engineer who has visited S'uthlam exactly twice in his life, for a total of maybe a hundred days, and yet feels competent to topple our government, discredit our religion, and lecture forty-odd billion strangers about how many puling children they ought to have. My people may be stupid, they may be short-sighted, and they may be blind, but they are still my people, Tuf. I don't think I entirely approve of your arriving here and trying to remake us according to your own enlightened values."

"I deny this charge, madam. Whatever my personal standards might be, I do not seek to impose them upon S'uthlam. I merely took it upon myself to elucidate certain truths, and to make your population aware of certain cold, hard equations, the sum of which is assuredly disaster, and cannot be changed by beliefs, prayers, or melodramatic romances on your vidnets."

"You're being paid—" Tolly Mune started.

"Insufficiently," Tuf interrupted.

She smiled despite herself. "You're being paid for ecological engineering, Tuf, not for religious or political instruction, thank you."

"You are most welcome, Portmaster Mune." He made a steeple of his hands. "Ecology," he said. "Consider the word, if you will, meditate upon its meaning. An ecosystem might be likened to a great biological machine, perhaps. If this analogy is pursued, humanity must be seen as part of the machine. No doubt an important part, an engine, a key circuit, but in no case apart from the mechanism, as is often fallaciously assumed. Ergo, when one such as myself re-engineers an ecology, he must by necessity refit as well the humans who inhabit it."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Now you're giving me a chill, Tuf. You've been alone in this ship for too long."

"This is an opinion I do not share," said Tuf.

"People aren't old pulse-rings, or blast-tubes to be recalibrated, you know."

"People are more complex and recalcitrant than any simple mechanical, electronic, or biochemical component," Tuf agreed.

"That's not what I meant."

"The S'uthlamese are especially difficult," Tuf said.

Tolly Mune shook her head. "Remember what I said, Tuf. Power corrupts."

"Indeed," he said. In this context, she hadn't a clue as to what it meant.

Haviland Tuf rose from his seat. "My stay here shortly will be at an end," he said. "At this very instant, the *Ark*'s chronowarp is accelerating the growth of the organisms in my cloning tanks. The *Basilisk* and *Manticore* are being prepared to effect delivery, on the assumption that Cregor Blaxon or his successor will ultimately decide to accept my recommendations. I would estimate that within ten days S'uthlam will have its meatbeasts, jersee-pods, ororos, et cetera. At that point I shall take my leave, Portmaster Mune."

"Abandoned by my star-bound lover once again," Tolly Mune said crossly. "Maybe I can make something out of that."

Tuf looked at Dax. "Levity," he said, "flavored with bitterness." He looked up again, and blinked. "I believe I have rendered great service to S'uthlam," he said. "I regret any personal distress that my methods have caused you. Such was not my intent. Permit me to make some small redress."

She cocked her head and looked at him hard. "How are you going to do that, Tuf?"

"A trifling gift," said Tuf. "Aboard the *Ark*, I could not help but notice the affection with which you treated the kittens. Nor did it go entirely unreciprocated. I would like to give you two of my cats, as a token of my esteem."

Tolly Mune snorted. "Hoping that stark terror will keep the security men away when they come to arrest me? No, Tuf. I appreciate the offer and I'm tempted, really, but vermin are illegal in the web, remember? I couldn't keep them."

"As Portmaster of S'uthlam, you have the authority to change the applicable regulations."

"Oh, right, and wouldn't that look great? Anti-life and corrupt too, I'd be real puling popular."

"Sarcasm," Tuf informed Dax.

"And what happens when they replace me as Portmaster?" she said.

"I have every faith in your ability to survive this political tempest even as you weathered the last," said Tuf.

Tolly Mune laughed raucously. "Good for you, but no, really, it just won't work."

Haviland Tuf was silent, his face blank of all expression. Finally he raised a finger. "I have devised a solution," he said. "In addition to two of my kittens, I will give you a starship. As you know, I have a surfeit of them. You may keep the kittens there, aboard ship, technically outside the jurisdiction of

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the Port of S'uthlam. I will even leave you with sufficient food for five years, so that it cannot be said that you are giving so-called vermin calories needed by hungry human beings. To further bolster your flagging public image, you may tell the newsfeeds that these two felines are hostages against my promised return to S'uthlam five years hence."

Tolly Mune let a crooked smile creep across her homely features. "That might work, damn it. You're making this hard to resist. A starship too, you say?"

"Indeed."

She grinned. "You're too convincing. All right. Which two cats, now?"

"Doubt," said Haviland Tuf, "and Ingratitude."

"There's a pointed comment in that, I'm sure," Tolly Mune said. "I won't pursue it. And five years worth of food?"

"Sufficient until the day, five years hence, when I return again to repay the remainder of my note."

Tolly Mune looked at him: the long, still, white face, the pale hands folded neatly atop his bulging stomach, the duckbilled cap resting on his bald head, the small black cat in his lap. She looked at him long and hard and then, for no particular reason she could name, her hand trembled just a little, and beer spilled from her open glass onto her sleeve. She felt the cold wetness soak into her shirt and trickle down her wrist. "Oh joy," she said. "Tuf and Tuf again. I can hardly wait." ■

IN TIMES TO COME

● Our December cover will be for "Runner," a new story from Bob Buckley whose title means exactly what it says—except that that's probably not what you think it means. But when you consider what our present transportation networks involve, and what's likely to happen to them in any large-scale collapse of civilization, you may begin to get the idea. Rebuilding exactly what you had before is not always the best way to get things working again. . . .

Our fiction will also include a new Callahan story from Spider Robinson; a new, more or less seasonally appropriate, and quite definitely peculiar "Woodside and Baker" tale from Thomas R. Dulski; and a disturbingly plausible account of a terror "everybody knows" is extinct from Rob Chilson and Lynette Meserole. There should also be a short story by Harry Turtledove, heretofore known to you as Eric G. Iverson; it seems one of his book publishers has talked him into doing everything under his real name, so the pseudonym will be gradually disappearing from his future *Analog* stories.

The fact article is another of J. E. Enever's intriguing speculations about cosmic traffic accidents, past and potential. This one is past: what *did* cause all those maria—on *one side* of the Moon?

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

RANDOM SAMPLE

Heidi Heyer

There's one requirement crucial to any research that depends on sampling. There's also a human tendency to cut corners, which may not be limited to humans. . .

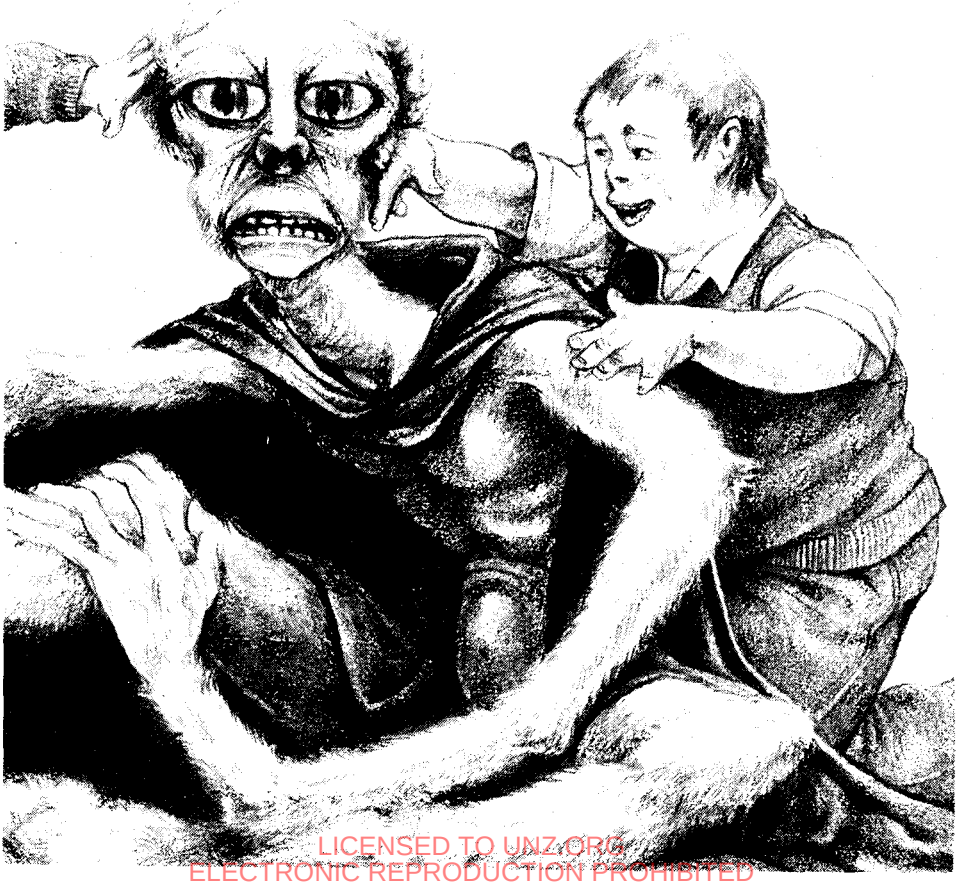
Judy Mitchell

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

It was forty seven or eight. Most of us were back from the big war. I was working at a home for retarded kids; they call them special now. The home's official name was The Hannah Lorenz Foundation for Down's Syndrome. I was one of the war's battered bastards and I didn't have the stomach or the nerve for ticker tape parades. After Bastogne I spent eight months in the hospital crying and staring at walls. By the time the Army had almost decided I was crazy and not the sensible coward I am, demobilization was in full swing, so they gave me a final flurry of tests that got me out with an Honorable.

This place was as far away from the post war hoopla as anyone could get. I didn't get paid much: room, board, and a little spending money, but I liked the work. Those kids didn't ask for much; a little patience, kindness and a shred of dignity were more than they dreamed of.

It was early December and I'd taken a few of the kids up to the Angeles Crest Forest to play in the snow. The old Buick had cracked her distributor cap that morning and it was past two by the time we got up there. I let the kids play until it was nearly dark to make up for



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the late start. Dusk doesn't linger in the mountains, and it was black as pitch by the time we started back.

The fresh air and exercise had tired the kids out and we hadn't gone many miles before they were all asleep. The unaccustomed exertion was taking its toll on me as well; I turned the radio on to keep from nodding off. There was no moon that night and those mountain roads were black and treacherous.

I must have fallen asleep. One minute I was peering through the blackness trying to bring the old crate around the turns, and the next I was in a white fuzzy room.

Jesus! It's been more than thirty years and I can still close my eyes and feel that hard whiteness pressing in on me. The walls, the floor, the ceiling, even the air, was a flat hard white. It was more than white. Every visible surface seemed to emanate a hard blinding glow, like August sun bouncing off a mirror, more glare than light. It was hard to focus on anything in that harsh brightness. I could have been in a closet or a football stadium. I was barely able to make out a person's shape a couple feet from me. Della was the only one that big. On my left I could hear Dan's adenoidal breathing.

"Kids," I said in my most matter of fact tone. After that first word I felt an odd reluctance to continue. It was as if a great weight pressed in on me when I spoke. It took all my determination to continue. "I want you to come over by me. I'm going to keep talking and I want you to come toward the sound of my voice. OK."

"But Mr Evan," wailed Martha somewhere out in the whiteness. "I can't see you!"

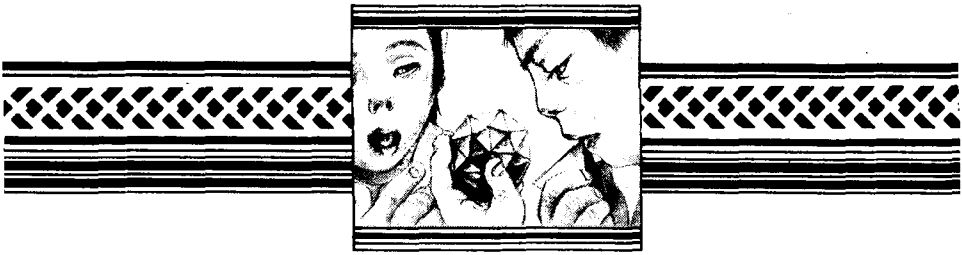
"That's OK Martha, you can hear me. Pretend it's dark. Close your eyes and find me."

I kept talking, keeping my voice low and calm. Della's hazy shape didn't move and neither did Danny's labored breathing. Finally I threatened to stop talking if they didn't start moving. That scared them more than moving through the white glare.

First came Della, scooting across the floor on her wide bottom, not trusting the glowing surface. Then came Stefan, moving gingerly on his feet and trying to act the man. Dan and Martha came in together on hands and knees, Dan's breathing even more labored. Mark and John scooted toward me, clutching each other for courage.

We sat in a small uncertain circle. I could just make out Stefan and Dell, sitting a yard away, holding hands. They were both past twenty with all their hormones intact and the Founda-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



tion frowns on that sort of liason. But Hell, they were scared. There's nothing like a hand to hold when you're scared. "OK you guys," I said, pretending I hadn't noticed Stefan and Dell. "Everybody hold hands." Dan was huddled on my right and Martha on my left. I took their hands and realized too late that Martha had been sucking her fingers again.

"Mr. Evan," asked Stefan, his voice cracking in spite of himself. "Where are we?"

I really wanted to take the pinched look off Martha's face, and quiet Dan's breathing, but I just couldn't lie to those kids. "I don't know Stefan." I said trying to make the words seem reassuring.

Those kids really were special. You try telling a bunch of normals that you don't know where they are, or how they got there, and see how they react. My kids just sat there—no protests, no crying or whining. They just sat there. True, Mark and John snuffled a bit, but they kept it quiet. So we sat in our frightened little circle, holding hands and waiting.

I have no idea how long we sat like that. A sort of white fuzz crept over me and I was perfectly content just to sit and wait. It was like falling asleep in class. You know you shouldn't, and you try to keep your eyes open. But you can't. Your mouth falls open, and your head drops onto your chest, and it feels like the best rest you've gotten in weeks.

After a while, and it could have been hours or minutes, the glare seemed to dim. I could focus on Stefan and Dell without squinting. Then I heard a voice. I looked around at the kids and could tell by their glazed eyes and gaping mouths that they hadn't heard a thing.

I remember thinking: Jesus, I am crazy! I started reciting poetry in my head. It's a habit from the bad days when the rhythm and cadence of beautiful words was the only thing that eased my hurt. I'd started on Poe's "Sonnet to Science" for the second time, when a tall, lean figure materialized out of the glare.

In the bad days I cried a lot and sharp noises had me shaking for hours, but I never saw or heard things. Even in that glare I could tell that whatever this was, it wasn't human. I checked the kids. Martha had both hands in her mouth and Dan had wrapped himself around my arm. Mark was sitting in John's lap. I took a deep breath and tried to swallow.

The creature was a biped, and easily seven feet tall. He couldn't have weighed more than two hundred pounds but he looked about as frail as a starving tiger. He was naked except for a shiny blue

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

cloak that fell from his shoulders and trailed the floor. Even in that glare I could see this alien carried apparatus that would make him a male anywhere on earth. He had the right number of arms and legs, but they were improbably long and triple jointed. They looked more like a spider's appendages that human limbs. His torso and skull were covered with a dull gold substance that looked a lot like top grain cow hide. The rest of his body was covered with short golden fur.

I was examining him for the second time, trying to take in the alienness of him, when the voice in my head spoke again. It was practically a shout this time. My hands started trembling and I sat on them before the shakes spread up my arms. The kids were still staring at the alien, the fear beginning to fade from their faces.

"You!" The voice barked. I tried to pick up the thread of Poe's sonnet but the voice was too much for me. "I'm talking to you!" It snapped. I looked up at the alien. His flat yellow eyes were fixed on me, reminding me of a hawk about to strike.

"Yes?" I said numbly, my lips silently forming the word.

An opaque membrane flashed across the alien's eyes, almost too fast for me to be sure. "Don't move your lips fool! Just your brain, if you have one."

"What do you want?" I asked silently.

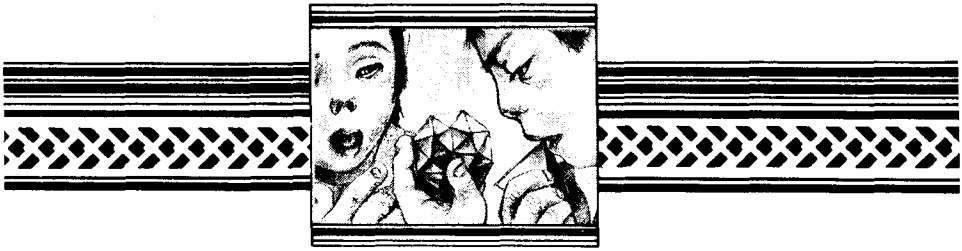
"Answers. Which of you is deviant, you or these . . ." The alien's four fingered hand came up to indicate my kids.

The question really made me mad. I mean which of us was deviant, my forever children, or Evan Miles, honorably discharged coward. I filled up my mind with Poe's sonnet shaping each word silently with sensuous care, blotting out the sound of his voice. My chaotic mind would have to be answer enough for a question like that.

The alien brought his four fingered hands together and clicked his heels—a kind of salute. Something about the way his lips pulled back exposing his teeth made me think of a grin, as if my show of hostility pleased him. Still grinning, he approached our huddle. Then, lifting his cloak out of the way, he sat down between Martha and John. I guess it was his version of cross legged, except it looked more like a knot.

Well it takes a lot to frighten Martha, and she'd long since recovered herself. I took her to the zoo once, and she kept trying to squeeze through the bars of the panther cage to "pet the kitties." Tall beige aliens didn't faze her any more than "kitties." The alien had no sooner settled his cloak around him, then Martha was in his lap, her slimy fingers

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



prodding the thick tufts of hair on either side of his head that I'd taken for ears.

"Oh Mr. Evan, feel!" She squeaked. "Soft! Soft!" Her little hands stroked the short golden hair that covered his legs and arms leaving slime trails.

The alien turned his head and positively leered at me. That chicken's neck of his allowed his head to rotate a full 200 degrees.

The other kids, intrigued by Martha's cries of delight, crawled over to the alien to make their own discoveries. Even John and Mark let go of each other to finger the alien. Danny was fascinated with the thick hide that covered the alien's torso, skull, and most of his face. First he rapped on it with his knuckles and giggled at the dull resonant sound. Then of course, the other kids had to try it too. Pretty soon they were all pounding on the alien and howling at the sound. Then Dan tried to get his fingers under the hide, where it ended just above the mandible, and pull it off. That must have hurt because the alien grunted and stood up, shaking the kids off like so many fleas. He shook his cloak as if it were contaminated, and let it billow gently to the floor.

"You!" The voice was back in my head. "My colleague will be testing you. Do not draw attention to yourself." He turned so sharply his cloak wrapped itself around his legs and he had to stop and untangle himself. Then he stalked off into the glare.

As soon as he was out of sight, the white seemed to intensify, and the same fuzzy lethargy descended on our little group. The kids huddled back down and reached for comforting hands. Martha's fingers had been back in her mouth, but all the same I was glad of the contact.

I don't think we'd been sitting long. It's hard to be sure. The glare seemed to dim again and it got easier to think. This time I heard a pair of voices. One I recognized as the voice I'd come to associate with the alien—staccato and harsh. The other was new to me. It had a whiney quality. This time I didn't even try to block the words.

"Seven should be enough . . ." It was Himself, staccato and commanding. ". . . even for you, Hcktn." He pronounced the name like a sneeze going through the nose.

"But sir!" Hcktn whined. "They're from a single sample! It wouldn't matter if I had a hundred subjects, it's no good if they're from the same sample!"

"This will be your only sample. Make it work."

"If it ever gets out that I drew my conclusions from a single sample, I'm finished! I'll have to manufacture data for samples we've never taken. What

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

if this sample is a statistical outlier! I'll be using an outlier as the norm and inventing data that falls within standard deviations of the *outlier!* This is utterly unethical sir! Utterly!"

I could see them now through the glare. They should have looked alike. They were both tall golden furred bipeds sporting organically grown body armor. But there was no confusing Himself with Hcktn. He walked lightly, on the edges of his feet, his body erect and relaxed. His flat gold eyes surveyed our little group like a general reviewing troops or a street fighter looking for an opening. Hcktn barely glanced at us, and stood on the flats of his feet, toes splayed. He had a slight stoop, as if his frail bones had grown weary of supporting his heavy head.

"This will be your only sample, Hcktn," Himself snapped. "I'll leave you to your work. Make it count."

"We don't know anything about the specimens, sir. They might be dangerous once they're free of the field."

"I doubt it. I have things to do on the bridge. You can handle them. After all, this is your mission."

"But sir, what if they attack me?"

"Look at them! Do they look like they're going to attack anybody?"

"They might get agitated when I take the cell scrapings. I really feel it would be best if we both stayed."

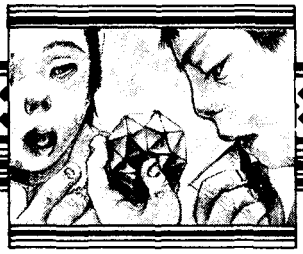
"I'm sure you do. . . . Leave the scraping until last; I'll try and get back in time to do them myself." Himself turned and strode off into the glare.

"Sir, wait! I, ah . . ." Hcktn actually wrung his hands, but Himself was gone. "Now, don't let them know you're afraid. If they smell your fear they'll turn on you. Keep calm. Just keep calm." While he'd been muttering to himself, Hcktn had taken a few shuffling steps away from our little huddle, his flat yellow eyes darting from child to child, as if he expected one of us to bare our teeth and growl. ". . . Calm . . . Keep calm . . ." He kept muttering.

He pulled a small flat silver box out of his cloak. It looked like a calculator or a remote control. His long quad jointed fingers flew over its surface, presumably punching buttons. A long low table seemed to materialize out of the glare. It's edges were indistinct, and it gave off the same hard white glow as the floor and walls, so it may have been there all the time.

He played with the remote control again and several indistinct objects materialized on the table. I really wanted to get a look at whatever was on that table; but I was afraid Hcktn would shoot me if I made any unexpected moves. He was that frightened.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Suddenly the glare seemed to recede, leaving our little huddle and the table in a patch of something like shade. The lethargy that had held us in our huddle evaporated. Martha blinked and shifted her weight. Della snatched her hand out of Stefan's with a faint giggle. John and Mark shook themselves like puppies coming out of the water. Their movement startled Hcktn and he leaped out of the clear area and into the encircling glare.

After their initial stirring, the kids settled back into the huddle.

"Mr Evan?" Danny said softly leaning against me. "I have to pee."

"Can you wait Danny?"

"No!" Dan whimpered.

I noticed his legs were crossed and he was fidgetting. "All right Dan, go over there." I pointed in back of me. "But don't go too far away."

Danny was in no shape to argue. He scrambled up, moved a few paces from the group, and did his thing.

He was already back in the huddle when I heard Hcktn in my head: "Filthy beasts!"

My eyes jumped to find him before I could think. The movement frightened him and he stepped further into the glare.

"Look you stupid cows." It was Hcktn again and I was getting tired of him. "Why don't you go over to the table and see what's on it?"

Well, I was sick to death of Hcktn's whining, and I wasn't going to do anything he wanted, and the kids couldn't hear him, so we sat. After a few minutes Hcktn couldn't take it any longer and he left the safety of the glare and approached our huddle.

He stopped well out of arm's reach and went through an elaborate pantomime indicating that he wanted us over at the table. My forever children aren't the brightest in the best of times, and now they were tired and scared. They just sat there staring at him, their faces flat and immobile. He went through his pantomime again. This time Della giggled halfheartedly.

"Listen, you stupid bovine," Hcktn swore, grabbing Della under the arms. "Come and look at the table!" He dragged Dell over to the table—no small task considering her size. He appeared prepared to drag us all over there, but Dell's cries of delight drew the other kids like magnets. I wasn't about to attract the attention of this mean minded alien, so I tagged along to the table.

The table was set for seven. That is, seven identical models of the same gadget were set about two feet apart. The gadget was a three dimensional maze enclosed in a glass cube. A silver

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

marble floated in one corner, and through the lattice of the maze I could see a small red light blinking in the center of the cube. Della had already discovered that the marble could be moved by placing a finger on the glass directly above it and then slowly moving her hand. The silver ball drifted after her finger like iron filings following a magnet. The children were entranced with the marble and totally oblivious to the objective of the maze. John and Mark were playing with the same maze giggling happily as the marble oscillated between their fingers. Della was bouncing her marble by tapping her finger against the glass. Stefan traced lazy patterns on the glass and smiled wisely as the marble drifted in slow circles. Hcktn nodded sagely at all this, the fine fuzz covering his mandible crinkling, and punched something into his remote control.

Before cutting me loose with an Honorable, the Army gave me every kind of test in the book: personality inventories, aggression indices, and half a dozen intelligence tests. Long before they were done with me I'd said "Nuts" to testing. These mazes had all the markings of a test and I wasn't playing, especially for old Sneeze-Through-the-Nose.

I followed the kids' example and ignored the blinking red light in the middle of the maze, contenting myself with maneuvering the ball. It was a pretty intriguing little toy. The marble seemed to be some sort of heat seeking device. I warmed the glass around the ball with my breath and sure enough, the ball ignored the lure of my finger and stayed within the warm confines of the misted glass.

We must have played with the mazes for at least ten minutes. Then they disappeared. One moment I was holding a cold, hard, real cube of glass, and the next there was nothing. Martha's lower lip trembled dangerously. Danny peered under the table in mystification.

Just as suddenly as the mazes had disappeared, a new test materialized. Have you ever seen those toddlers' toys, the kind with all sorts of two dimensional shapes: circles, squares and triangles? The child pushes the shapes through the correctly shaped holes. It's supposed to teach shape discrimination or something. This was the same toy except it was a lot more complicated. Like the maze, the shape board was three dimensional. In addition to the basic shapes, spheres, cubes and pyramids, there were over a dozen polyhedrons based on pentagons, octagons, equilateral triangles, isosceles triangles and shapes I didn't recognize. If you placed the wrong shape in a hollow, the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

board spit it back at you. When the correct shape and hollow met, the entire board lit up with tiny silver lights. The kids liked the lights and really tried to match the shapes with the hollows.

It was painful to watch. They got the sphere and the cube, but even the pyramid was beyond them. After several failures they simply picked up a shape at random and tried to cram it into a hollow. I could see the frustration mounting in their faces. Finally Martha gave up, brushing her shapes onto the floor with an angry swipe of her arm. Mark and John began building a haphazard tower with their shapes, giggling happily every time it tumbled. Della and Stefan simply abandoned their boards and sat on the floor holding hands. Danny was the only one still stubbornly trying to match shapes with indentations, snuffling softly in frustration. I dropped the sphere and cube into their respective hollows, and then followed the kids' technique of randomly cramming shapes into holes, pushing when they didn't fit. Danny burst into tears and Martha patted his face with her wet little hands. Then the shape boards were gone.

This time only three teasers appeared; three transparent spheres filled with a kaleidoscope of tiny fairy lights. The kids were spellbound. Mark and John shared a ball and so did Della and Stefan. Martha grabbed the last ball, although she earnestly assured Danny that she would: ". . . share with you Danny as soon as I'm done."

At first they treated the balls cautiously, gently rolling them on the table and watching the lights wink on and off. Then Mark and John began playing catch, clapping as the ball left a trail of tiny lights that hung in the air for a breathtaking second. They'd gotten off about two tosses when Mark let out a startled yelp and dropped the ball. "It bit me Mr. Evan!" He said accusingly.

"Me too!" whimpered Dell sitting down heavily and letting her ball roll down the table. Stefan smiled gently and sat down beside Dell.

I snagged Dell's ball as it rolled by; before I could examine it properly, Martha hurled hers at Danny and burst into tears. "Hurts, Mr. Evan! Hurts!" She howled.

I was still holding Dell's ball trying to figure out what was going on. Suddenly the ball discharged a small electric shock, just enough to be painful. I dropped the ball in a hurry. No wonder Martha was crying, with her slimy hands that little shock had probably hurt a lot. "Dan," I said softly, "let's not touch the balls any more."

Danny hesitated a moment and then

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

let Martha's ball roll gently into the glare. I rolled Dell's after it. Martha came over and leaned against my legs. I sat on the floor and pulled her into my lap. Even in that unholy glow I could see her pudgy palms were an angry red. Dan sat down and leaned against me. Della and Stefan crawled over and sat a few feet away holding hands. Mark and John mutely made our little huddle complete.

Hcktn played with his remote control and the table and the fairy spheres disappeared. I stared at the beige alien. Those spheres hadn't malfunctioned, they were designed to hurt us. It was all part of the testing. Hcktn must have read the hostility in my eyes because he retreated even further into the white glare. Minutes passed. I kept my eyes on Hcktn, enjoying the nervous way he shifted his weight and avoided my eyes. Suddenly the alien took a deep breath and straightened his shoulders. Himself, straight as an ancient Samurai, materialized out of the glare.

"Well, Hcktn," his voice was more commanding than I remembered. "How did it go?"

"Well sir," Hcktn whined in my brain. "I can't draw any conclusions without more samples, but this particular sample seems to be harmless sir, and very stupid. They're sentient, but barely. Even our Zckte have higher aggression scores."

"M-m-m-m. Well, I'll do the cell scrapings, Hcktn. Unless you want to do them yourself?"

"No, sir!" said Hcktn, stepping deeper into the glare. "I'll just go and prepare the dye baths for the scrapings."

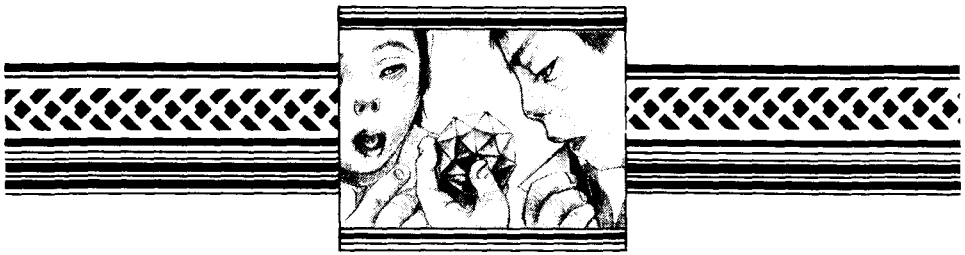
"Very well, Hcktn."

"Thank you sir!" Hcktn scuttled off into the glare.

Himself stood there for several seconds, his head tilted a little as if he were listening. Abruptly he relaxed and his face leathers bunched into what I hoped was a grin. "Stupid fool," he said in my head. "And he's called a man these days." The thought carried a nuance of bitterness.

He played with a silver remote control box similar to Hcktn's, and a small table materialized out of the glare. Picking up a small knife and something that looked exactly like a test tube, he squatted beside Martha. She took one look at the knife and began to whimper. Himself extended a single quad jointed finger, and brushed her temple. Martha went quiet. He ran his knife along the inside of her arm, as if he were shaving her with a straight razor. Then he dropped the knife into the test tube and returned it to the table. He repeated the process with each of the kids. Stefan

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



was last. Himself scraped him twice using two different knives. As he dropped the second knife into a test tube, he looked at me, his face leathers bunching. "This, my friend," he said, shaking the tube, "is you."

After putting the last two test tubes away, he came over and squatted in front of me so that our eyes met. "There are many of you, aren't there?" It sounded more like a prayer than a question. "Tell me friend, do your people kill each other? Not these," he gestured toward the kids. "But the ones like you, do you kill each other?"

I had to answer him. I can't explain it. Maybe it was the way his flat yellow eyes clung to mine, or the tension in his fingers. My lips were dry and my mind had gone numb. I just nodded.

He closed his eyes and took a deep breath. When he opened them, tears glistened on his inner lids. I remember thinking it odd that aliens could cry. "Do you make war? Do your people make war?" There was a painful urgency in his voice.

I had to laugh. We'd just gotten done with the biggest war in human history and he wanted to know if we fought.

He took my laughing for a yes. "And do you like fighting?"

I shrugged, biting back the bile that rose in my throat. "War is older than our history. It seems to define our species. Some of us are shamed by that."

This time Himself laughed. It was an awful sound, more like a seal choking than anything else.

The kids stared at him not knowing what to make of the sound. Martha started to cry.

He cut the laugh off in mid-bark and the planes of his face realigned to form his customary hauteur. "Peace," he said harshly, "is for gestating women and grazing beasts. We—" There was a world of bitterness in his voice. "—have had peace for a hundred years. Hcktn is the product of that peace." He spat. "Hcktn and I and a hundred like us are scouring the galaxy for any species that might threaten our peace. You are the first killer sentients any of us have found. The Fate be praised that Hcktn is too domesticated to recognize you for what you are. If he had, your species would be exterminated. Our leaders promise us a millennium of peace." He spat again. "My people will be fatted cattle, docile and stupid, in half that time. Our instincts will atrophy. Our urges will die. Passion will be a vestigial twinge." He spat. "We will be no different than the half dozen grazing, bovine sentients we have encountered. You, little killer, remember what I have said. Hide your people until you

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

are ready to fight! Then come and find us! Find us, little killer, and be the redemption of a race."

The next thing I remember, we were back in the old Buick. The headlamps were still on and motor was running. The kids were sitting exactly as I remembered. Their faces had a rigid, strained look. I didn't say anything, just eased the car into gear and started for home. No one spoke the rest of the way back.

I didn't bother telling anyone. I could just hear what they would say: "That's nice, Evan." Or, "Have you seen things like this before?" In fact, I wasn't so sure I hadn't been seeing things, but a couple of days later Martha handed me a crayon drawing. It was a crude, but unmistakable depiction of a tall, triple jointed, gold furred alien, naked except for a long blue cloak that swept the floor. I still have that picture folded away somewhere.

I haven't thought about this much in the last thirty years. But now Voyager and Pioneer 10 are heading out toward the rim of the solar system and beyond . . . Just a few more chunks of man's garbage in space, I know. But the Fates are not benevolent twice. . . . ■

(continued from page 69)

15. hat; pain endured
16. burn, sick; schmaltz, fake
17. heroin; ray; flautist
18. lever; Winnebagos
19. mandible, crest; (guffaw); swallow-kin
20. everything, pelted; optimum, mix
21. element 56; extended period of revolution
22. glass-making scraps; fib, (God, it's cold!)
23. malicious burning; Hebridean; joker
24. 45"; wheel chock; run away
25. coffee; corridor, kingdom
26. horticulturist; nap, armed combat
27. short haircut; element 47, hamlet

(continued on page 129)

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

on gaming

Dana Lombardy

"Stay alive. Don't panic. And have a good time." Excellent advice in any situation, but especially when playing *The Hitchhiker's Guide to the Galaxy*, a computer game for the Apple II, Atari, Commodore 64, TRS-80, IBM PC, and other systems, from Infocom Inc., based on Douglas Adams's hilarious novels ($39.95 at your local store, or direct from 55 Wheeler Street, Cambridge, MA 02138).

Adams, a fan of interactive fiction computer games, wrote the series of misadventures for the game himself, along with game programmer/designer Steve Meretzky. As a result, the text is very faithful to the tone of the books. For example, if you try something that doesn't work, the computer doesn't just tell you that nothing happens; it may inform you that was a silly thing to try. The wry, warped humor of the books is an integral part of this game.

Within the *Hitchhiker* novels, an unremarkable Englishman named Arthur Dent steps out of his house one morning to discover a bulldozer about to flatten his domicile. A new highway is being built, so his house has to go.

Arthur's neighbor, Ford Prefect, suddenly appears to return a towel he's borrowed from Arthur, and informs Dent of an even more remarkable disaster looming. Ford tells Arthur not to worry about the bulldozers since the entire planet is about to be destroyed to make way for an intergalactic freeway. Ford, it seems, is from the star Betelgeuse (pronounced "beetle-juice") and has been on Earth gathering data for a revision of "The Hitchhiker's Guide to the Galaxy," a combination AAA travel guide and the Junior Woodchuck's manual that tells about everything in the universe and offers advice to travelers. (Ford's update on Earth consists of changing the description from "Earth—a harmless planet" to "mostly harmless.")

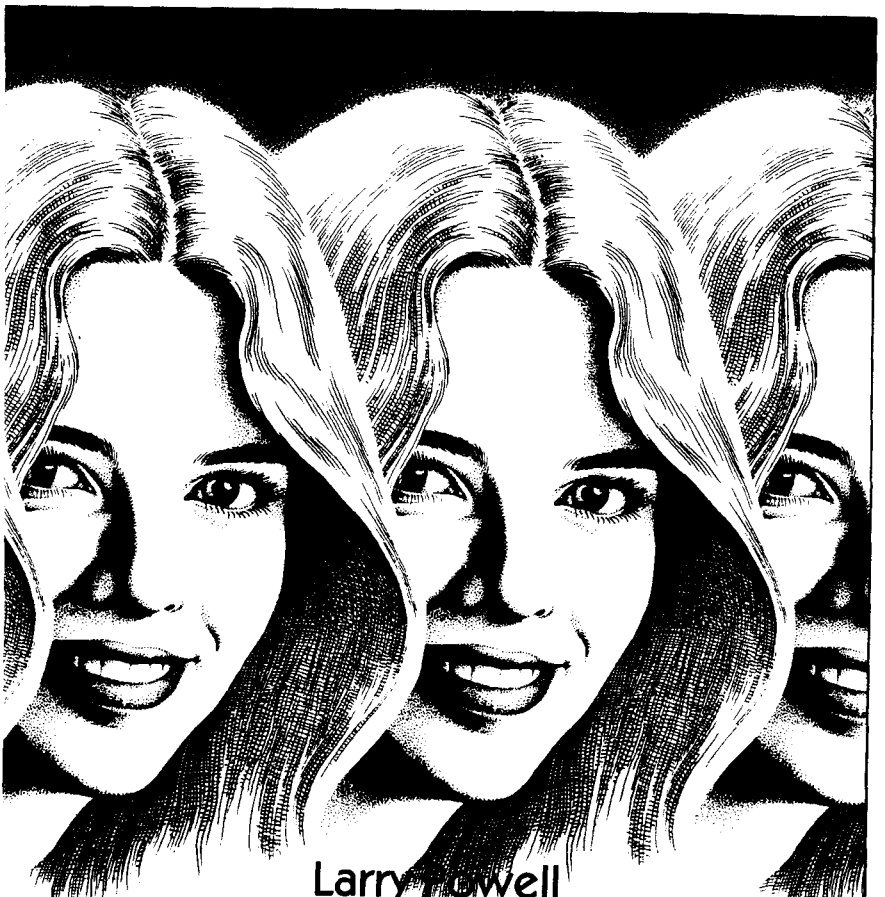
Using his Electronic Thumb, Ford manages to hitch a ride for them both on a Vogon spaceship just as Earth is destroyed. Now the fun begins in a story that includes egomaniacal robots, starships powered by Improbability Drives, bad poetry, and of course, *The Hitchhiker's Guide*.

Within the game, you are Arthur Dent. The action begins as you discover the bulldozer bearing down on your house. The story line at this point follows the book pretty closely—but don't take that towel from Ford Prefect too soon! Before long, however, you'll find that doing exactly what was done in the books is a silly thing to try. You will only make matters worse as often as not. But, as *The Hitchhiker's Guide* says, "Don't Panic." The challenge in this game is figuring out what you have to do in each situation presented as the story unfolds. Fortunately, you have *The Guide* to help you.

(continued on page 186)

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



Larry Lowell

SIBLINGS

In a sense, every
human being is isolated from all others.
But these had a
special kind of loneliness. . . .

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Little change, he thought, as he set his lunch down and seated himself. The wallpaper looked different, but maybe they'd just scraped the grease off. The chairs and tables were still the same old dinette castoffs; he put his toe on one of his table's feet and his coffee surged precipitously over the lip of the cup. He sighed, reassured, and mopped at the hot spill with a crumpled napkin from the next table. It had been years, the temper of the times had changed, and he had feared that the Coffee Shop had become, well, macdonaldized. And now that he was embarking on his thirties, it was good to see that something had not been altered and cheapened. It was still an authentic university greasepit. An aging freak, very likely one who had haunted this place when Tom was an undergrad, fumbled with quarters and buttons at the jukebox by the door, and the bittersweetness of "Lay Lady Lay" rolled forth. Tom sat back and listened, letting an amber wave of almost-melancholy roll over him.

Thus it was, he thought, *thus it was* . . . He had spent many long evenings down here as a student, gulping dreadful coffee and pawing through his books. It was a more interesting environment than the library, and besides, you could smoke in here, and punch up a couple of tunes on the jukebox. Around eight o'clock or so there would be a great stomping and blowing and banging of the door as most of the students in the library simultaneously decided to take a coffee break. Someone he knew would always come in with the draughts, Murphy or Kirschow or Bess, and sit for a while. Later that became less important, though, as he spent his winter evenings down here knee to knee with Molly, fingers twined together as they studied. He'd half expected to see her sitting at their old table when he came in, looking up sidelong through blonde bangs, seaweed spiral of cigarette smoke rising from the ashtray before her. The old unblunted ache, strong in this place of many associations, rose in him again: loss, accusation, that familiar emotional two-step he went through like a trained horse every time that he thought of his lost Molly. He broke the sequence with an effort, but depression settled over him like a fine silt. *Still not shut of her, still not, she left yesterday*, he thought, and took a searing sweet bite of his danish.

Mopping at his eyes, he looked about the room. The same sort of crowd as he remembered, though now they were crammed into tighter jeans and every pile of books had a calculator on it that would have cost a fortune a few years back. It was just before noon and the place was starting to fill up, students crowding in, a few guzzling the last of their coffee and hurrying out past the jukebox. He turned to watch a girl standing by a table down the aisle, looked away, then looked back. *A ghost, of sorts*, he thought; *that stance* —She stood straight, round bottom taughtly defined by the faded jeans. He covertly studied the lines of hip and flank, the broad shoulders, the corn yellow hair tumbling down her back, and thought of how he'd seen Molly in every strapping blonde girl for months after coming home to an empty apartment. *This girl is her living image, from the rear*, he thought, *or am I just hungry of heart?* He raised his cup as she

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

turned, and started, sending a burning dollop of coffee into the tender junction of thumb and forefinger. He scarcely noticed, as she walked down the aisle toward him with that gently swaying, heavy-hipped walk. The round, well-remembered face with wide, half smiling mouth, the large blue eyes—she looked full at him without the slightest trace of recognition, then half-turned to slip by some jock ruminating between tables. Tom found his tongue.

"Molly?" he said, low and urgent. *Howinhell it's been ten years but it's her IT'S HER . . .*

She paused in the act of passing, upper thighs pressed against the table's edge, and gazed down at his pale face in gentle curiosity.

"Molly? Is it really you? It's me. Tom. I never thought . . ."

He got no further. Her eyes chilled, the soft open planes of her face stiffened, and she said in a harsh frightened voice, "No, that's not my name, I've never seen you before." She brushed past the jock, then clopped off like a young mare, round hips swaying, and pressed by the door with one sidelong scared look at him.

Tom looked down, eventually, at coffee puddled by his elbow, and set mechanically to work mopping it up. He felt hollow. He had looked forward to a thousand different versions of this reunion, but never one like this. *But then*, he thought, *it wasn't really her*. Not unless she had lost that decade. Just a younger sister, of a sort, a sweet echo of the flesh. A final proof of an old hypothesis. He had finished teaching for the day, and had some thinking to do. The liquor store on Edinburgh Street would be the handiest to the walk home.

His rum and coke was sweet and strong. He leaned back in his solitary chair amid all the cases, and looked out across the smoky crazy-quilt Indian summer hills to the south of town. His desk and the old wooden office chair were the only items of furniture in the living room. Essentials first; the desk top was littered with lecture notes and texts choked with bookmarks. He put his feet laboriously up on the desk, took another sip of his drink, and thought back ten years to when the days were like dustmotes drifting in a column of sunlight.

They had shared an apartment under the eaves of an old house up on Waterloo Street, and he'd not been so happy before or since. A winter's worth, more or less, but he had never reckoned on even so much. I love you, she'd said in a small serious voice one morning, on the old mattress beneath the parachute shroud, and within the week his life had blossomed into mellow domesticity. The top of the toilet tank crowded with bottles of odd lotions, a spice rack in the kitchen, a bullseye rug in the middle of the bedroom floor, and a calico kitten mewing round their feet. And this was in late fall, sweet thin ghost of summer.

His parents had frowned on this, of course, but no more than they had on his long hair or patched jeans. Hers, she said, were dead; that was all she ever said of them without bitterness, and he had never asked further. She'd had him well trained, he'd often thought later, with the layered honey and ice of her

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

character. But it hadn't mattered then, the sudden centering of his life on her. He was stricken, his friends had told him; that girl has really gotten her hooks in you, they'd said, as he turned down invitations to a night's boozing. He'd disregarded this, the happy lotus eater; or at least, whatever faint dissatisfactions hummed around his ears would whiff away when he came down the Coffee Shop stairs and saw Molly crouched over a book at the corner table. It was debilitating, he'd thought in the odd moment, it was humiliating, that this young mammal had drawn him so surely into her orbit, managed him so serenely and easily. But then the tender passion would submerge him again, and he'd think of the homey apartment, the calico kitten, the silky nights, and count himself lucky. If he lost her, he'd thought, he would be like a lost dog.

How true. He got up and poured himself another stiff drink, and decided that he may as well be out-and-out maudlin. The picture was under some papers in his lower drawer. He pulled it out, settled himself back, and looked at his younger self with a tall blonde girl. They stood before one of the tall maples on Waterloo Street, hands linked, the red and gold leaves scattered about their feet. It was the girl he'd seen in the Coffee Shop, of course; there could have been no mistake. He let the photo drop to the floor and thought back again.

He had taken genetics that year, and in one lab they had scraped the insides of their cheeks and smeared epithelial cells on a slide, then incubated them with colchicine. Molly had wandered in halfway through to bum a dollar, and he'd taken a cheek scraping from her. Checking on your gender, he'd told her, putting the slide beside his in the incubator. He did his squashes and staining that night, then watched the instructor take a series of photos of each. The next week he'd got his prints and negatives back, and had sat down that night at the kitchen table with scissors and glue and laboriously snipped out all of the chromosomes from one of his own prints. Not XXY, he'd noted with some relief, lining up the homologues on a white card, ranking them by size and configuration. Twenty-two pairs of homologues, the mis-matched sex chromosomes; thank you very much, mother and father, here are your first marks in me.

Molly's squashes were oddly crowded. None of the cells seemed to have escaped being smeared together. He'd looked closer, then began carefully snipping black symbols from the clearest print and gluing them on a card. All from one cell? He'd chosen another print, and did the same with it, then stared at the two karyotypes before him in the bluing evening light. Three X chromosomes—that alone would give her Turner's syndrome, wouldn't it? But there was three of everything, twenty-three sets of triplets, stubby or stringy, laid out on each card.

He'd been busy snipping out a third set when Molly came in from a late class, early spring gusting in through the window as she opened the door. What's all this, she'd said, laying her books down and crowding beside him, which is you and which is me. And he'd told her, this is mine, this almost-matched double set here; and these are yours, and you are a very strange lady,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

with three of everything. Her hand had stiffened on his nape, and she'd asked, what would that mean? He'd confessed total ignorance and great befuddlement. Only bananas counted their chromosomes by threes, as far as he knew, but the question would be put to a higher authority tomorrow, and undoubtedly the answer would be fascinating. And till then . . . the kitten leaped onto the table and skittered through the karyotypes, knocking them to the floor. Tom put them into his shoulder bag and then was distracted in a most pleasurable way. Strange to say, he'd forgotten about threefold genomes for the rest of the evening, but the argument used on him was persuasive and ancient.

She'd awakened him briefly the next morning, on her way out to an early class, but he rolled over and drowsed off for another hour. Full day, but starting late; no need to hustle out of bed until ten. He was well on his way up Gordon Street before he thought to check his bag for the envelope containing the prints and negatives. They weren't there. *Hell*, he'd thought, and almost turned back, but then decided they'd be safe enough on the kitchen table till tomorrow.

When he walked down the hill and across the river in the still, porcelain-colored evening, he was thinking hard on the significance of the prints for the first time that day. He must have screwed up somehow. Nobody could have so many chromosomes and live. Look at the phenotypic effect of a simple trisomy or non-disjunction. He'd seen photos of the botched babies and mules resulting from those meiotic blunders. *There's nothing wrong with Molly's phenotype*, he thought as he turned the corner below the cathedral.

He'd known that she was gone as he stood awkwardly on one foot in the hall, worrying the boot off the other. Her running shoes were missing from the mat beside the door. So the absence of much of her clothing and books, the evidence of neat but hasty plundering through their four rooms, the lack of a kitten stropping its sides against his ankles—all of these things dropped through his mind heavily and quietly, like rocks through still deep water. *God*, he'd thought numbly, as he stepped irresolutely through the darkening rooms, *this is like something from one of those dreadful C&W songs*. A terse message was scrawled in soap on the bathroom mirror. "I have to leave. Don't look for me. It's not your fault."

He'd blown that term, of course. And of course he'd looked for her, combing the town, harrassing University officials and the police. One would not tell him anything but her forwarding address, which he knew anyway and which turned out to be a fabrication. The other, perhaps having encountered such situations before, pointed out that she was of legal age, promised to let him know if she came to the attention of the law, and refused to initiate any inquiries beyond the border of the town. A ticket seller at the bus station recalled a tall blonde girl with a kitten in a basket and a suitcase, buying a ticket to Toronto. Toronto—there was really no point in looking for her there, if she didn't want to be found. At that realization he'd abandoned his muddled search effort. She didn't want to be found, she'd said so, and any further explanation would

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

have to go owing. Once his resolve had collapsed he'd been unable to think of anything to do but drink, and once he'd started it was too much of an effort to think of any reason to stop. He'd withdrawn from the University and returned to London, and to his surprise, his parents had taken him in and dried him out, without saying anything.

The University authorities had said quite a bit, when he applied for re-admission. But his grades had been good, before his "breakdown" (the euphemism they both used), and old Aubrey had spoken for him, and so he had taken up his studies for lack of anything better to do. And for lack of anything better to do he'd made a decent go of them, having become a singular emotional tortoise. During those first boozy weeks after she'd left, and still, less painfully, more profoundly, ever since, he'd gone through that emotional pavane until the steps were worn in his mind. *Like that girl in* The Demolished Man, he'd thought once, early on, then forgot about the simile and eventually forgot to notice the condition. There was always his work, first the B.Sc., then the arduous, consuming travail of graduate school. He'd led an eremitic life in Ann Arbour, shuttling between key punch, laboratory, library, and apartment. But out in the woods, in the cold pools of March, he watched the cold wriggling passion of salamanders in the beam of his miner's lamp; and in the lab, he watched their gilled, drifting offspring, sisters all, and took smears of their tissues, and saw again a threefold signature. Parent and parent and . . . ?

He hefted his glass again, noted that it was almost empty, and poured a lot more rum into it. The cola was out of reach. So he'd been right about Molly, had he? Well, by God, he'd find that younger sister of hers and . . . and what? He looked off again across the low hills. Why did it have to happen here?

Two days later he was sitting in his small office with the door shut, doing some calisthenics. Heels on the desk, legs straight, now lever yourself up on your arms, then down to the seat, up again, then down . . . There was a rap at the door and it opened suddenly, catching him with his body held parallel to the floor and the back of his jacket hanging down from his shoulderblades. A convulsive start brought him down with his shoulders crammed between the arms of his chair and his feet at the very edge of his desk. He glared up at the intruder over the arm of the chair, then began to clamber to a seated position.

"God, I'm sorry—shouldn't have barged in like that," said his visitor. "Are you okay? Tom—I didn't mean to startle you. Remember me?"

"Yes," he said shortly, examining the heel marks on the edge of the desktop. There seemed to be something wrong with his left knee. He concentrated on flexing it slowly, rather than look at the woman by the door.

"Well . . . are you sure you're okay? What were you doing, anyway?"

He looked up blankly, staring past her left shoulder. "Exercises. I was feeling a little dozy—it helps me wake up," he said to the wall behind her. In truth, he still hadn't quite recovered from his boozing session of two nights before —not used to it anymore—and hadn't

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

slept well besides. Couldn't she have waited another day or two?

"Oh, I see. Well, I . . . well, it's good to see you again. You haven't changed." That certainly wasn't true. There was a nervous undertone to her voice, a forced brightness. He looked fully at her for the first time, and she smiled and clasped her hands together. He thawed slightly.

"Have a seat, Molly."

She smiled again, a bit more brightly, then moved in front of the desk and pulled up the chair intended for visiting undergrads. There was a glass tank resting to one side of the desk before her, and she peered into it. There was nothing to be seen but a smooth carpet of moss, with rotting, lichen covered pieces of birch wood sunk in it. She looked up at him, and laughed slightly.

"It's good to see you again. I'd heard you were here, and happened to be in town on business, so I dropped by. Always knew you'd be a prof someday," she said. Her voice had changed, become deeper, more brassy. He stared at her. Her hair was shorter, banged and shoulder length, and somewhat darker near the scalp. She was a little heavier looking, the eyes and mouth framed by a few faint lines. The wide blue eyes and gentle mouth themselves hadn't changed, though. She was the same girl he'd loved on Waterloo Street—older twin to the one he'd accosted in the Coffee Shop two days ago. But the figure before him was dressed in a sensible blue skirt and jacket.

Her smile faded under his scrutiny, and she raised her left hand to brush at her bangs. Two rings glittered at him from the third finger.

"I guess that you aren't really very happy to see me," she said in a low voice, looking down.

"No, it's not that, I—" he said quickly. Two rings. "Why did you leave? Where did you go?," he blurted. Jesus, and why did he care?

She leaned back in her chair and regarded him through her bangs. "You know, I think. Those photographs that you took." Her face was perfectly composed and her voice level. He regretted his outburst, but pressed on.

"What of them? Was that any reason to just clear out? God, what I went through. Never a word, never a sign. You said you loved me. I never . . ." To his horror he felt his eyes start to burn, and brushed at his forehead with his unadorned left hand. Let her figure it out—she never missed a thing.

She sat quietly for a few moments, then reached into her purse for a cigarette. He seized the chance to reach for one of his, to cover his confusion. She breathed twin plumes of smoke down the front of her jacket, and looked at him again. Her face was gentle and implacable.

"Those photos. You'd've figured them out, or someone would've. I think that you have now. I couldn't afford to wait around and find out, not then. Better that way."

"Find out what?" he asked, as guilessly as he could.

"Come off it, Tom," she said tonelessly. "You know. You saw my cousin the other day. Why else do you think I'm here?"

"Because I thought your cousin was you? That's a funny reason to ferret me out."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"You know, you always were an evasive bugger." She sounded weary. "Just how frank do I have to be?"

Just frank enough. He tapped some ash off his cigarette. "All right," he said, "I've figured out a bit about it. You've got a younger cousin who looks just like you. She and you—"

"The pictures," she broke in, still gentle and unyielding. "You saw those prints, and I know you remembered. You've published since then, right? We—I know your name. I've read those papers, done a little research." She looked at the mossy terrarium. "Do you have some of those creatures in there?" she asked. He nodded, fresh out of gambits. "Could I see one, please? I've read your stuff on them, but I've never seen one."

He lifted the glass top of the tank and rolled a piece of wood over, then lifted out the salamander that was sitting and *flinching in its hollow. It sat gulping on* his palm, dark indigo with a spattering of pale blue along the sides, like a small embodiment of the tropical night sky.

"What sort is this one, the triploid or the normal?" she asked, standing and peering at the damp little shape in his hand. It looked back at her with opaque jet eyes. Tom gently flipped it over on its back with one finger, and caught a glimpse of the tattoo on the belly before the salamander twisted back onto its feet.

"*Ambystoma laterale,*" he said. "The diploid."

"Is it really that hard to tell?"

"Well, no. I can tell the *tremblayi*, the triploids, from the regular product. You develop an eye for it." He glanced at her, but she was still intent on the salamander. "It's not really hard. The *tremblayi* are a little paler than the *laterale*—it's in the later field guides. These ones are tattooed because I was using them in the field work in Rondeau."

"Tell me about that, will you?"

"You said that you'd read my papers. Why do you want to know about the field work? Just a lot of standing around in ponds at night, freezing my ass off and watching salamanders go at it. Nothing interesting about it."

"I, actually, I didn't read those papers myself. One of my sisters did, and told me about it. I want to hear it from you."

"*One* of your sisters? That girl—"

"Liz? She's my cousin—I told you. We don't have the same mother. One of my sisters—oh, hell what does it matter? You know that. There's a number of us."

It had occurred to him more than once, but he hadn't taken the thought seriously. "A number?" he asked.

"Never mind that now. Please, will you tell me about this salamander business? In your own words?" She resumed her seat and looked at him with wide eyes.

"All right. The biological mechanism and all that?" he asked. She nodded. *Concessions still come easy*—he choked that off. The salamander made a clambering rush for his fingertips, so he closed his hand and lowered it back onto the moss. It posed motionless, gulping, as he sat down.

"All right," he said again, then paused and looked at her. "You've got some of the background, haven't you?" She nodded again, intent. He rescued

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

his cigarette from the ashtray and gestured with it as he talked.

"Well, then, you know that there are two species of these salamanders, almost identical, but one has a different chromosome number from the other? They're what's called sibling species—indistinguishable by gross morphology, but the chromosome numbers differ and the two are usually good species, not interbreeding. There've been a number of them discovered since taxonomists started using karyotypes and electrophoresis in their work, two species that were classified as one because nobody but them could tell the difference. Those gray tree frogs we get around here, for instance. Two different species, but nobody can tell by looking." He paused and tipped the ash off his cigarette. "All right, so we have these sibling species. In the great majority of cases, one has an even multiple of the chromosome number of the other. There's thought to be a number of mechanisms that can cause this sort of reduplication, but never mind them now."

He paused again. "Okay so far?" She nodded briefly, eyes on his. "Well, these salamanders are something different. These in here," he reached over and tapped on the glass, and the salamander blinked at him, "they're diploid—two sets of each chromosome, you know—and have two sexes, male and female, the standard arrangement. Their sibling species—*Ambystoma tremblayi*—have three sets of chromosomes—3n. They have no males, none at all. They reproduce by going down to the ponds in spring, when the diploids are mating, and mate with the male diploids. Their sperm stimulates the triploid eggs to begin development, but they make no genetic contribution —there's no fusion of the spermatocyte with the egg nucleus. So you see, the offspring of each female triploid, each *tremblayi*, are identical sisters, identical to their mothers. They're all clones. The father doesn't contribute at all, except in getting the process started." He stubbed out his cigarette and looked out the window into the parking lot.

When he looked back at her she was contemplating her hands, folded in her lap. She glanced up at him.

"Do you have any of the triploids here?" she asked quietly.

"No. Didn't like to have them around." She flinched slightly at that, finally, "Not live ones, anyway," he continued stonily. "I've got some pickled ones here if you'd care to see those."

"No, I'll pass on that. You've given me the background on this thing. Why did you get into it?"

His temper flickered briefly. "Well, it's an interesting problem, isn't it? I mean, what happens to the male diploid's reproductive output? These things don't live forever, you know—a few chances to breed, and that's probably it, and if you blow too many of those you probably won't pass your genes on, you're an evolutionary non-starter. What is it about these female triploids that attracts the males and makes them waste their sperm? Because that's what it is, you know, a waste. The male doesn't get any descendants out of it. That's what I was working on for my doctorate—what having a population of *tremblayi* around did to the mating be-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

havior and reproductive success of a population of *laterale*."

"And?"

"They crowd the diploids out, if there are enough of them. They're sexual parasites, really. And they seem to be a bit more alluring than the diploid females."

She frowned at that. "Sounds self-defeating to me."

"Oh no. The *tremblayi* can exist without the *laterale*. The eggs can initiate development on their own somehow, if they have to. I'm not sure how."

"Then why—"

"I don't know that either. I thought maybe you could tell me." There—it was out in the open now. Would she pick up the gauntlet? He looked levelly at her, but she had returned to the contemplation of her hands. Baffled anger and grief moved about behind his eyes. He lit another cigarette.

After a while, she looked up sidelong at him.

"You were very sweet, Tom. I'd've stayed with you, you know. But those photographs—I didn't know, none of us knew, why we were different back then, but we knew we were. When I first saw those prints, well, I had to leave you. That was the first real difference that anyone had ever noticed about us, apart from the obvious one. And that's easy enough to cover up, when you know you have to. Maybe I should have stayed, but . . . it's something our mothers drum pretty hard into us, nobody else should know. I didn't know anything but that you'd found something different about me, but that was enough, I got scared and ran, and I couldn't go back to you after that, could I? Because if you'd had any suspicions, they'd've been confirmed. I didn't know what being triploid meant, but I knew you'd figure it out. We don't go for fools, Tom. So I ran home to Mother."

He raised an eyebrow at that.

"No, never mind where. I think the less you know the better."

He hunched forward in his chair and looked at the immobile salamander. "Don't you think you owe me a bit of an explanation?" he said around his cigarette.

"No."

"Why the hell not? Christ, Molly, I loved you. I . . . oh hell, the hell with it." He slouched back and stared bitterly at his blotter, then looked back at her. She'd lit another cigarette, and regarded him coolly through the smoke.

"Mother warned me about this. She told me that I was an idiot to shack up with you, and she told me I was one to come back to see you, but my other relatives thought I should. Just to find out what you know. And that's plenty." She paused reflectively. "I loved you too, you know. It seems to be a phase we go through—all the older sisters say so, and they say you get over it if you have to. I guess I did. But then, well, you remember what it was like back then. I'd had enough of discipline, everyone our age had, and then you came along and I did what came naturally with you. But I guess that my training never left me. It hurt to leave you." She paused for a drag, then went on carefully. "It doesn't hurt any more."

"Thanks." He tried not to let on how that had wounded. "Any more kind words?"

"Don't thank me yet. Listen, I'll tell

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

you a little, if it will keep you quiet. Will it?" He was noncommital, and she looked sullen for an instant. "Well, I'll tell you." But then she sat silent, staring with unfocussed eyes at the cigarette in one hand. He was about to say something caustic when she suddenly returned her attention to him.

"Listen, I want you to promise me something. If I tell you—a little—will you promise not to track me down? Or any of my family? It'd be a nuisance, you know. I don't live anywhere near here anymore, but still."

"Okay. Now, you were . . . ?"

"All right. And if you were wondering about all the secrecy, just think. It isn't easy being, well, sort of a freak, let alone a whole family of them. I mean, at first it was sort of a local marvel, from what I heard. But my grandmother's husband left her, she'd married a doctor, that was a mistake. He kept quiet, I think—anyway, she moved a long ways off in a hurry. I—men—I'm not putting this too well. A father expects to see himself in his children, to have sons to raise. And when he only gets carbon-copy daughters who grow up into their mother's image . . . well."

"Isn't that a little—"

"You don't know," she said harshly. "We do. We know men. But we're still women, we still want someone to sleep with, a child to raise. It's easy for you to, to say that it shouldn't matter. Of course it does. My ancestors didn't know, they found out. People in a small fishing village notice when your grandchild looks just like you did when you were a child, especially if both your daughters were the same. Imagine what they thought of that a couple of hundred years ago!" She stared at him for a moment, then abruptly got to her feet. "It matters a hell of a lot," she said more quietly, going over to the window and leaning against the frame, "a hell of a lot. Eliza, she was the first, in that fishing village, she was beaten to death by her son-in-law. He thought she was a witch of some sort, after his wife had given him three identical daughters and four miscarriages. Oh, that's another thing I guess you explained to us—why we have such trouble carrying a child. I guess being triploid can make for a lot of ruined ova, can't it?"

"Probably." He looked up at her with something akin to dislike. "You still haven't told me much."

"The most important thing. That hasn't changed. It's been passed on from mother to daughter for generations, and we still don't see any reason to change. It's not all that hard to keep up the pretense, in fact it's easier now than ever. Fashions change quickly, people move around a lot, cities are big, nobody thinks twice about a single woman with a child—you can fade right into the woodwork. Well, I think I've said enough." She moved away from the window and picked up her purse from where it sat slouched by the chair, stubbing out her butt in his ashtray on the way past, then stood as if trying to decide on some parting words.

"You still haven't told me much," he said heavily, still seated unmoving.

"As much as I think I want to. What else do you want? You know more than any man, more than my husband'll ever know. You know what the secret is, and why we keep it a secret. And that is all I want you to know. Nobody's going

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

to believe you on the strength of that. I've played about as much of my hand as I intend to."

"Well, thanks a lot for that."

"I—" she started, then her face softened and she moved a bit closer to the desk. "All right, Tom, I'm sorry. I've played cat and mouse with you, and I've lied to you, a little. No, not the important things," she said in response to his raised eyebrow. "I wanted to know how much you know, and what you'd figured out, but I wasn't trying to be cruel. It's just so hard to be honest about all this. I would just as soon not have seen you again, and I think that you felt the same way. When I bolted like that, I didn't know what you knew or might have figured, but when your name started showing up in journals—and finding that and making the connection was a lucky accident for us—then I started to wonder. I mean, it looked awful funny, didn't it, you living with me and then going on to work on those creatures. And then when you saw Liz, we grew up together, she knew what you must have thought and called me. I came on my own. Nobody else in the family knows about this. That's one of the reasons you have to keep quiet. Promise?"

He looked up at her, the long full lines of her, the open blue eyes. "All right. Will I see you again?"

"No, I don't think so. Not a good idea for either of us, is it? Why don't you just forget about me?"

"I can't."

"No . . . I was afraid of that."

"You smug bitch—" He groped for words.

"It happens. I was told. Goodbye, Tom. I'm sorry—believe it." She closed the door gently behind her. A minute or two later he watched her stride across the graveled lot to her car. She stood by the driver's door, the wind flinging bright hair about her shoulders, and looked back at the blank silvery windows of the new wing, then bowed her head, got in the car, and drove away. He turned his attention back to the desk. The salamander still sat on the moss, watching him with jet eyes. He met its gaze briefly, then snorted and grabbed his briefcase, and left.

Somebody was moving into the building that night—a little late for the start of term—and so the foyer door was wedged open with the rubber mat and Tom didn't know that he had a visitor until he heard a gentle rapping. He got up from his wooden swivel chair, beat at the cloud of smoke around his head, and answered the door.

"Um, hello," said the girl standing there. She smiled shyly, familiarly.

"Oh," he said. The image before him blurred—was she standing there in baggy dark trousers and ruffled blouse, in blue bell bottoms and a plaid felt shirt, in a trim blue business suit? Did it matter? "Come in."

With a radiant smile she stepped into the living room, surveyed the clusters of cardboard boxes and the littered desk, then turned to face him.

"Hope that I'm not disturbing you," she said, going through some interesting contortions to get her orange pack off her back.

"No, I was just having a drink. What do you want?"

"To talk to you. Cath—Molly was by today, I was talking to her, and I

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

thought, well, I'd . . .'' She trailed off, watching his face. ''Well, I can't say I'm sorry, can I? I didn't do anything, not really. But if you want to talk, I'll listen.''

She'd set her pack by her feet, and nudged it slightly as she shifted her stance. It rolled over heavily, a few books and a toothbrush sliding out the open top, He saw, and she followed his gaze, then flushed richly.

''All set, eh? Did your family decide this, or was it just you and Molly?''

''No, no, it wasn't anything . . . I'm sorry, please, I'm sorry, I'll go.'' She bent over and shoved the offending articles back into the pack, clumsy with distress. As she heaved it to her shoulder and turned to go, he reached out and touched her arm. The eyes she turned to him were brimming.

''I liked the look of you,'' she said quietly, unevenly. ''Please don't think that of me. I know what she said to you—but it broke her heart to do it. She told me you were such a decent man. And I liked the look of you.''

We don't go for fools, Tom. Don't you just, he thought, then brought the swivel chair forward. ''Have a seat.'' He thought of the salamanders in their cold spring ponds, then banished the thought. She raised her bright head, and slowly shrugged her pack off again. ■

(continued from page 114)

28. have sex with (arch.); smallest unit of life, like, leg joint
29. hemp fibers; tavern; kyrie———
30. hot dog; marijuana, injury
31. exercise room; nemesis
32. mandible; coffee; metalworker
33. being a dean
34. total, basic principle of nature; petition, burn, strike, groovy
35. antiSaxon; rotation, 100 ergs per gram
36. canyon; cutting tool
37. shilling; money, (blues key)
38. snoopin'; everything here in Brooklyn
39. duck, fiddlesticks!
40. opposite of night, Scottish male; opposite of day
41. chromosome; masher
42. interdental voiced fricative (Old Norse); trappers
43. went quickly, toy; attic
44. yours and mine, elsewhere; ocean; secretarial assistant
45. German; tragic heroine
46. Sumerian city, prison chamber, Japanese tape deck; hind limb, gain
47. bequeath a sweet potato; Bo Derek
48. light beam; spike, inter

(continued on page 133)

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The Alternate View

DIABETES AND ROCKETS

G. Harry Stine

One of the fascinating aspects of continually surveying science and technology is the intellectual joy of occasionally being able to stick two or more pieces of data together in a novel synthesis and then communicate the results through a medium such as this column. I've been at it for a third of a century because it's a fascinating endeavor that occasionally offers some insights. Or it provides an occasional opportunity to breathe, "Gee whiz!" (NB: I am an unreconstituted techno-romantic who still has that ancient, obsolete, unsophisticated "sense of wonder" that keeps getting rejuvenated every day when the sun rises precisely as the astronomers and statisticians predicted.)

You may have sensed this in reading past columns. I've deliberately tried to range afield often to the accompaniment of howls of indignation, a nit-picking of data, and a questioning of data sources.

Nothing could be more illustrative of an alternate view of the universe and a biosociative synthesis of seemingly unrelated data than the title and subject of this month's column.

What do diabetes and rockets have to do with one another?

Answer: Biotechnologists wouldn't be on the verge of a cure for diabetes if it hadn't been for millions of space-crazy model rocketeers buying, building, and flying more than 200 million of those little model rockets.

Herein lies a strange, unbelievable, but fascinating story of technology, science, and business. If Lee Correy tried to write it as science fiction, it wouldn't be possible to achieve the willing suspension of disbelief that's essential to fiction. Reality doesn't have to live with that limitation.

I had something to do with the hobby-sport of model rocketry—like starting the whole affair back in 1957 because it was clearly the way for non-professional rocketry enthusiasts to build and fly rockets without getting hurt. This story has been told elsewhere ("Demon In A Bottle," *Astounding Science Fiction*, April 1960). Suffice to say that in 1958 I needed someone to mass-produce the little solid propellant rocket motors for my fledgling hobby rocket company. A Denver garage construction contractor, Vernon D. Estes, did it. My little undercapitalized company folded. Vern Estes went on to build Estes Industries, Inc. Whenever model rockets are mentioned, people think of Estes. In 1969, Vern sold the company to Damon Corporation of Needham Heights, Massachusetts.

Damon is a biotechnology company. It was and is still known mostly for its medical diagnostic laboratories in many locations throughout the country. Whatever possessed a biotechnology company to get into the hobby business? In

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a spate of 1969-1970 acquisitions, Damon put together an educational division which eventually became its hobby and crafts division making Estes and Centuri model rockets, Hi-Flyer kites, and Arrow crafts. Estes became a profit center for Damon.

Model rocketeers kept wondering why prices continued to go up and up and up. A model rocket motor once sold for about twenty cents; now it's a buck or more. Estes's simplest kit, the Astron Scout, sold for 69 cents in 1960; now the same kit costs $2.95. Damon never released any numbers on sales or profitability of Estes, but my network of Little Black Spies continually reported seven digit numbers. After all, when you sell 200,000,000 rocket motors with, say, a ten-cent profit on each, you've got a nice chunk of change. But where was all that money going? Damon was mum. As a result, it took a lot of flak from kids who thought the greedy, capitalistic, money-grubbing Damon Demon was raping their hobby.

Now the truth can be told:

Millions of model rocketeers financed the biotechnological research that led in 1984 to Damon's announcement of a means for mass production of large quantities of human monoclonal antibodies and encapsulated islet cells.

Damon Biotech, Inc. was formed in 1973 as a sudsidiary of Damon Corporation. Damon Biotech borrowed $10.3 million from Damon to finance the development of its breakthrough. Most of that money came from young model rocketeers who, over the years, were making an unknowing contribution to the development of a cure for some forms of cancer and diabetes. And, of course, they couldn't be told about it. In the first place, they probably wouldn't have believed it. . . .

(I told you this was a strange story. It's the stuff SF stories should be made of, but who'd believe it? Arthur C. Clarke was right, but in a different way than he thought.)

So much for the business gee-whiz. How about the technological wizardry?

Modern biotechnology is concentrating on producing materials such as interferon, monoclonal antibodies, and interleukin 2 which will assist and enhance the human body's natural defenses against disease in contrast to the traditional approach of using synthetic chemicals. Living cells must be manipulated and grown to produce these new products. Doing this on the experimental laboratory level is relatively simple. It's a different matter to scale the processes up to the level of mass production for widespread use. Damon developed a microencapsulation product called ENCAPSEL™ to permit the growth of living cells in high densities which, in turn, enables the production of large quantities. ENCAPSEL™ permits the encapsulation of living tissue cells of biological products in microscopic porous containers where they grow and produce their products while being protected from the surrounding environment.

Microencapsulation was developed decades ago for separating or protecting inert materials such as ink or pesticides. Developing the technology to permit enclosure of living cells produced a process that is gentle and can be carried out in an aqueous environment at biologically benign temperatures and pH.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

The process sounds simple (it isn't). Biological materials are suspended in a gelling fluid, then formed into droplets of controlled size which fall into a chemical solution where they form into gelled spheres. Each sphere is then coated with polymers which form a tough but porous outside membrane. The gel is then reliquified and flows out through the pores of the membrane, leaving only the biological materials safely enclosed in each microsphere. The size of the sphere and its pores can be controlled.

The formed spheres are placed in a reactor vessel and provided with nutrients. Inside the capsules, the biological materials are protected from contamination while having access to nutrients through the pores.

Some of the biologicals that have been produced in ENCAPSEL™ capsules include human hybridomas, mouse hybridomas, human lymphoblastoids, human diploid fibroblasts, and recombinant DNA-containing mammalian cells. All grow to higher densities than in conventional suspension cultures. Some hybridomas have grown to a density approaching that of living tissue in the human body and have produced yields of monoclonal antibodies as much as 1,000 times greater than in conventional systems. When an optimum amount of production has occurred, harvesting takes place and the capsules are opened mechanically to release the desired cells into a clean saline solution. The comparative purity produced by the ENCAPSEL™ system runs from 45% to 70%, in contrast to other cell systems such as mouse ascites which run from 5% to 20% purity levels.

The encapsulation system is amenable to mass production—as high as 1 milligram per milliliter in contrast to 10-20 micrograms per milliliter from ordinary tissue culture systems.

The ENCAPSEL™ system is being employed in a new approach to fighting B-cell lymphoma, a cancer of the immune system that produces tumors in the lymph nodes, bone marrow, and other lymphoid organs. B-cells are white blood cells that normally produce antibodies to defend the body against foreign substances or antigens. B-cell lymphoma is believed to derive from an uncontrolled proliferation of a single B-cell. Cancer antigens are grown in an ENCAPSEL™ system using blood tissue samples from the patient. An animal is then injected with the specific cancer antigen thus produced, and the animal's immune system in turn produces antibodies against this antigen. A second hybridoma that will mass produce the antibody is then created from the animal cells and produced in quantity in an ENCAPSEL™ system. The resulting customized antibody against the patient's specific B-cell lymphoma is then injected into the patient, the antibodies react with the cancer antigen, and the cancer cells are destroyed without damaging healthy tissue. The ENCAPSEL™ system cuts the required time for this process from months to days and increases the quantity of monoclonal antibodies to the level where it becmes economical to treat each patient on an individual basis.

ENCAPSEL™ is also being used as a delivery system for the administration of biologicals and conventional drugs as well as for the transplantation of liv-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ing cells. One of these approaches involves the transplantation of living cells to combat diabetes. Insulin-producing cells from a healthy pancreas are encapsulated and then injected into a diabetic recipient. In experiments thus far, encapsulated islet cells have not been rejected for extended time periods because the surrounding microcapsule rendered them immunilogically "invisible" to the host's immune system. Meanwhile, the transplanted pancreatic cells in the microcapsules continue to function normally, producing insulin. As blood serum passes into the microcapsule through the engineered membrane, the cells are alerted to the blood sugar level, and insulin is released as needed into the bloodstream, maintaining a stable glucose level in the patient. This is still an experimental technique. But it offers the potential of injecting a diabetic with encapsulated islet cells once every few years—or perhaps eventually once in a lifetime—and thereby eliminating the consequences of diabetes.

This timed delivery feature of ENCAPSEL™ also promises a means for controlled release of vaccines and the elimination of "booster" shots.

Lee Correy and others have from time to time written this sort of thing into science-fiction stories ("The Remodelling of Eve," Lee Correy, *Analog*, July 1979, for example). Look out, folks! The engineers took the "flight to the Moon" stories away and made them reality; and they're already starting to do the same thing with the biotechnology stories!

And who would have ever guessed that it was financed by kids of all ages flying model rockets? ■

For more information, write:

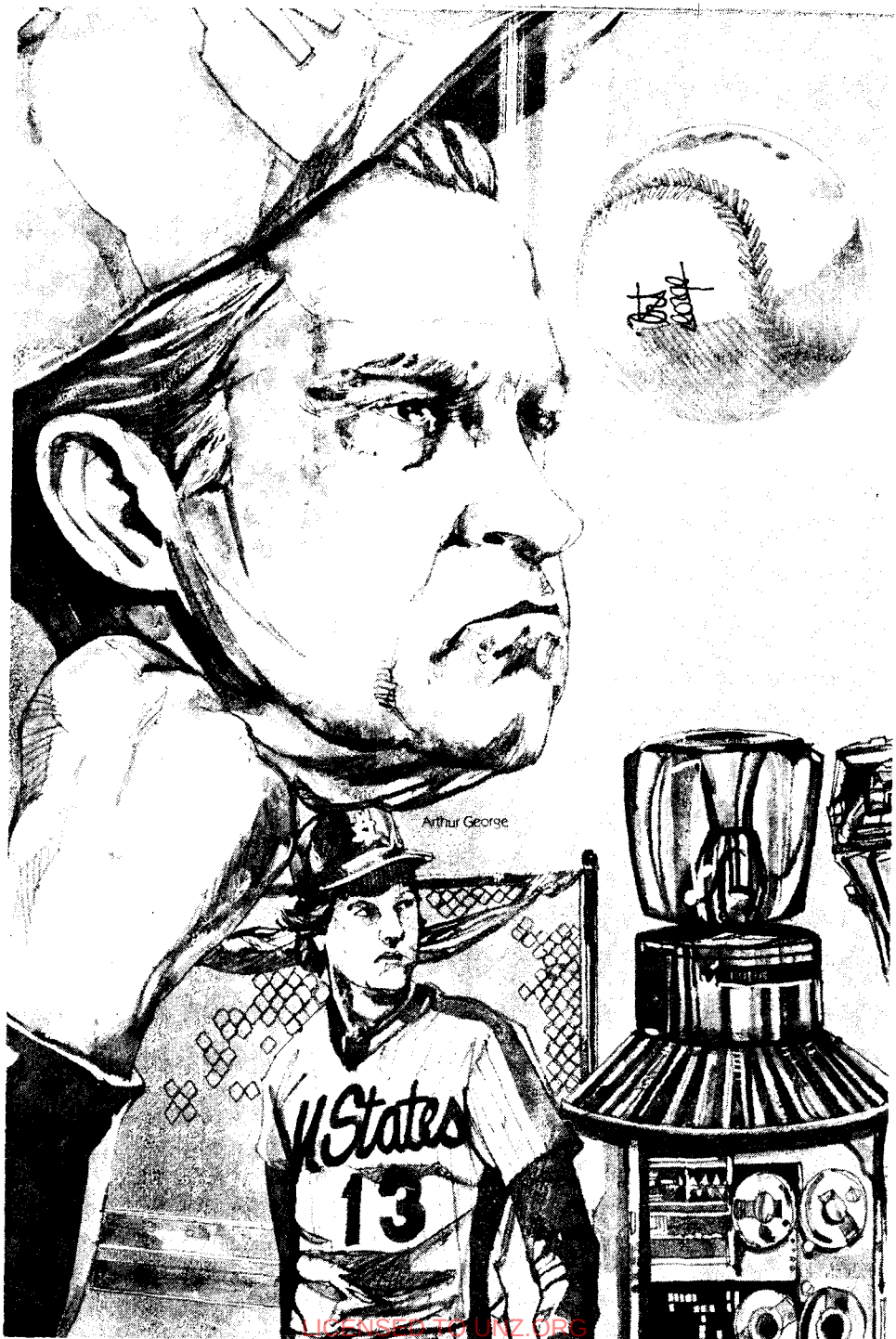
Marcia Amsterdam Kean
Vice President, Public Information
Damon Biotech, Inc.
119 Fourth Avenue
Needham Heights, MA 02194
(617)449-6002

(continued from page 129)

49. kelp's; support
50. celebrated Spot; Slim Whitman style; some or all
51. observed a woman; red-breasted heir
52. supernatural servant; larcenous star
53. also sketched; kill the thing
54. beloved secret agent; cheer, receptacle, illicit fun
55. cutting remark; possible remedy for same
56. filamentous nuclear material interconnecting chromatin granules; monastery

P.S.—this entire contest, clues, answers and concept, is copyright 1983 by Spider Robinson, and all rights are reserved. Unauthorized use constitutes "game, taunt, grass-root," that is, "play, jeer, rhizome." Violators will be (Lazarus Long's favorite men's wear). The answers will be found on page 177.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Wherein technology comes to the aid—more or less—of future diplomacy . . .

Ben Bova

BÉISBOL

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Nixon sat scowling in the dugout, his dark chin down on the letters of his baseball uniform, his eyes glaring. It wasn't us he was mad at; it was Castro.

Across the infield, the Cubans were passing out cigars in their dugout. Top of the ninth inning and they were ahead, 1-0. We had three more chances at their robot pitcher. So far, all the mechanical monster had done was strike out fourteen of us USA All-Stars and not allow a runner past first base.

Castro looked a lot older than I thought he'd be. His beard was all gray. But he was laughing and puffing on a big cigar as his team took the field and that damned robot rolled itself up to the mound.

Nixon jumped to his feet. He looked kind of funny in a baseball uniform, like, out of place.

"Men," he said to us, "this is more than a game. I'm sure you know that."

We all kind of muttered and mumbled and nodded our heads.

"If they win this series, they'll take over all of the Caribbean. All of Central America. The United States will be humiliated."

Yeah, maybe so, I thought. And you'll be a bum again, instead of a hero. But he didn't have to go up and try to bat against that Commie robot. From what we heard, they had built it in Czechoslovakia or someplace like that to throw hand grenades at tanks. Now it was throwing baseballs right past us, like a blur.

"We've got to win this game," Nixon said, his voice trembling. "We've *got* to!"

It had seemed like a good idea. Use baseball to re-establish friendly relations with Cuba, just like they had used ping-pong to make friends with Red China. So the Commissioner personally picked an All-Star team and Washington picked Nixon to manage us. It would be a pushover, we all thought. I mean, the Cubans like baseball, but they couldn't come anywhere near matching us.

Well, pitching may be eighty percent of the game, but scouting is two hundred percent more. We waltzed in to Havana and found ourselves playing guys who were just about as good as we were. According to a CIA report their guys were pumped up on steroids and accelerators and God knows what else. They'd never pass an Olympic Games saliva test, but nobody on our side had thought to include drug testing in the ground rules.

Oh, we won the first two games okay. But it wasn't easy.

And then the Commies used their first secret weapon on us. Women. It was like our hotel was all of a sudden invaded by them. Tall showgirl types, short little señoritas, redheads, blondes, dark flashing eyes and luscious lips that smiled and laughed. And boobs. Never saw so many bouncing, jiggling, low-cut bosoms in my life.

What could we do? Our third baseman hurt his back swinging by his knees from the chandelier in his room with a broad in one arm and and a bottle of champagne in the other. Two of our best pitchers were so hung over that they couldn't see their catchers the next morning. And our center fielder, who usually batted clean-up, was found under his bed in a coma that lasted three

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

days. But there was a big smile on his face the whole time.

By the time the Cubans had pulled ahead, three games to two, Nixon called a team meeting and put it to us but good.

"This has got to stop," he said, pacing back and forth across the locker room, hands locked behind his stooped back, jowls quivering with anger.

"These women are trained Communist agents," he warned us. "I've been getting intelligence reports from Washington. Castro has no intentions of establishing friendly relations with us. . . ."

Somebody snickered at the words *friendly relations*, but quickly choked it off as Nixon whirled around, searching for the culprit like a schoolteacher dealing with a bunch of unruly kids.

"This isn't funny! If the Commies win this series, they'll go all through Latin America crowing about how weak the United States is. We'll lose the whole Caribbean, Central America, the Panama Canal—everything!"

We promised to behave ourselves. Hell, he was worried about Latin America, but most of us had more important problems. I could just imagine my next salary negotiation: "Why, you couldn't even beat a bunch of third-rate Cubans," the general manager would tell my agent.

More than that, I could see my father's face. He had spent many years teaching me how to play baseball. He had always told me that I could be a big-leaguer. And he had always asked nothing more of me than that I give my best out on the field. I wouldn't be able to face him, knowing that we had lost to Castro because we had screwed around.

We went out there that afternoon and tore them apart, 11-2. That tied the series. The seventh and final game would decide it all.

That's when they brought out their second secret weapon: Raoul the Robot, the mechanical monster, the Czechoslovak chucker, the machine that threw supersonic fastballs.

I thought Nixon would have apoplexy when the little robot rolled itself up to the pitcher's mound to start the game. It looked sort of like a water cooler, a squat metal cylinder with a glass dome on top. It had two "arms": curved metal chutes that wound around and around several times and then fired the ball at you. Fast. Very fast.

Nixon went screaming out onto the field before our leadoff batter got to the plate. Castro ambled out, grinning and puffing his cigar. The huge crowd—the Havana stadium was absolutely jammed—gave him the kind of roar that American fans reserve for pitchers who throw no-hitters in the seventh game of the World Series. He turned, doffed his cap just like any big leaguer would, and then joined the argument raging at the mound.

Nixon did us proud. He jumped up and down. He threw his cap on the dirt and kicked it. He turned red in the face. He raged and shouted at the umpires —two of them from the States, two from Cuba.

The crowd loved it. They started shouting *"Olé!"* every time he kicked up some dirt.

The umpires went through the rulebook. There's no rule that says all the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

players have to be human beings. So Raoul the Robot stayed on the mound.

He struck out the side in the first inning. Leading off the second inning, our cleanup hitter, well rested after his three-day coma, managed to pop a fly to center field. But the next two guys struck out.

And so it went. Raoul had three basic pitches: fast, faster, and fastest. No curve, no slider, no change-up. His fast balls were pretty straight, too. Not much of a hop or dip to them. They just blazed past you before you could get your bat around. And he could throw either right-handed or left-handed, depending on the batter.

He couldn't catch the ball at all. After each pitch the catcher would toss the ball to the shortstop, who would come over to the mound and stick the ball in a round opening at the top of the robot's glassed-in head. Then the machine would be ready to wind up and throw.

"Hit him in the head," Nixon advised us. "Break that glass top and knock him the hell out of there."

Easy to say. Through the first four innings we got exactly one man on base, a walk. Their catcher adjusted the little gizmo he had clipped to his chest protector, and the mechanical monster started throwing strikes again.

By the time the ninth inning came around, we had collected two hits, both of them bloop pop-ups that just happened to fall in between fielders. Raoul had struck out fourteen. Nixon was glaring pure hatred across the infield. Castro was laughing and passing out cigars in the Cubans' dugout.

Our own pitcher had done almost as well as the robot. But an error by our substitute third baseman, a sacrifice fly, and a squeeze bunt had given the Cubans a 1-0 lead. That one run looked as big as a million.

Our shortstop led off the ninth inning and managed to get his bat on the ball. A grounder. He was out by half a step. The next guy popped up, not bad after three strikeouts.

I breathed a sigh of relief. The next man up, Harry Bates, would end the game, and that would be that. I was next after him, and I sure didn't want to be the guy who made the last out. I went out to the on-deck circle, kneeled on one knee, and watched the final moment of the game.

"Get it over with, Harry," I said inside my head. "Don't put me on the spot." I was kind of ashamed of myself for feeling that way, but that's how I felt.

Raoul cranked his metal slingshot arm once, twice, and then fired the ball. It blurred past the batter. Strike one. The crowd roared. *"Ole!"* The catcher flipped the ball to the shortstop, who trotted over to the mound and popped the ball into the robot's slot like a guy putting money into a videogame machine.

The curved metal arm cranked again. The ball came whizzing to the plate. Strike two. *"Ole!"* Louder this time. Castro leaned back on the dugout bench and clasped his hands behind his head. His grin was as wide as a superhighway.

But on the third pitch Harry managed to get his bat around and cracked a solid single, over their shortstop's head. The first real hit of the day for us.

The crowd went absolutely silent.

Castro looked up and down his bench,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

then made a big shrug. He wasn't worried.

I was. It was my turn at bat. All I had to show for three previous trips to the plate was a strikeout and two pop flies.

Automatically, I looked down to our third base coach. He was staring into the dugout. Nixon scratched his nose, tugged at the bill of his cap, and ran a hand across the letters on the front of his shirt. The coach's eyes goggled. But he scratched his nose, tugged at his cap, and ran his hand across the letters.

Hit and run.

Damn! I'm supposed to poke the first pitch into right field while Harry breaks for second as soon as the pitcher starts his—its—delivery. Terrific strategy, when the chances are the damned ball will be in the catcher's mitt before I can get the bat off my shoulder. Nixon's trying to be a genius. Well, at least when they throw Harry out at second the game'll be over and I won't have to make the final out.

The mechanical monster starts its windup. Harry breaks from first, and *wham!* the ball's past me. I wave my bat kind of feebly, just to make the catcher's job a little bit tougher.

But his throw is late. Raoul's windup took so much time that Harry made it to second easy.

I look down to the third-base coach again.

Same sign. Hit and run. Sweet Jesus! Now he wants Harry to head for third. I grit my teeth and pound the bat on the plate. Stealing second is a lot easier than stealing third.

Raoul swings his mechanical arm around, Harry breaks for third, and the ball comes whizzing at me. I swing at it but it's already in the catcher's mitt and he's throwing to third. Harry dives in head first and the umpire calls him safe. By a fingernail.

The crowd is muttering now, rumbling like a dark thundercloud. The tying run's on third.

And I've got two strikes on me.

Nixon slumps deeper on the bench in the dugout, his face lost in shadow. Both Harry and our third-base coach are staring in at him. He twitches and fidgets. The coach turns to me and rubs his jaw.

Hit away. I'm on my own.

No, my whole life didn't flash before my eyes, but it might as well have. Old Raoul out there on the mound hadn't thrown anything but strikes since the fourth inning. One more strike and I'm out and the game's over and we've lost. The only time I got any wood on the ball I produced a feeble pop fly. There was only one thing I could think of that had any chance.

You can throw, you goddamned Commie tin can, I said silently to the robot. But can you field?

Raoul cranked up his metal arm again, and I squared away and slid my hand halfway up the bat. Out of the corners of my eyes I could see the Cuban infielders suddenly reacting to the idea that I was going to bunt. The first and third basemen started rushing in toward me. But too late. The pitch was already on its way.

Harry saw it, too, and started galloping for home.

I just stuck my bat in front of the ball, holding it limply to deaden the impact. I had always been a good bunter, and this one had to be perfect.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

It damned near was. I nudged the ball right back toward the mound. It trickled along the grass as I lit out for first, thinking, "Let's see you handle that, Raoul."

Sonofabitch if the mechanical monster didn't roll itself down off the mound and scoop up the ball as neatly as a vacuum cleaner picking up a fuzzball. I was less than halfway to first and I knew that I had goofed. I was dead meat.

Raoul the Robot sucked up the ball, spun itself around to face first base, and fired the baseball like a bullet to the guy covering the bag. It got there ten strides ahead of me, tore the glove off the fielder's hand, and kept on going deep into right field, past the foul line.

My heart bounced from my throat to my stomach and then back again. Raoul had only three pitches: fast, faster, and fastest. The poor sucker covering first base had never been shot at so hard. He never had a chance to hold onto the ball.

Harry scored, of course, and I must have broken the world record for going from first to third. I slid into the bag in a storm of dust and dirt, an eyelash ahead of the throw.

The game was tied. The winning run —me!—was on third base, ninety feet away from home.

And the stadium was dead quiet again. Castro came out to the mound and they didn't even applaud him. The catcher and the whole infield clustered around him and the robot. Castro, taller than all his players, turned and pointed at somebody in the dugout.

"He's bringin' in a relief pitcher!" our third base coach said.

No such luck. A stumpy little guy who was built kind of like the robot himself, thick and solid, like a fireplug, came trudging out of the dugout with something like a toolkit in one hand. He was wearing a mechanic's coveralls, not a baseball uniform.

They tinkered with Raoul for about ten minutes, while the crowd got restless and Nixon shambled out of our dugout to tell the umpires that the Cubans should be penalized for delaying the game.

"This ain't football, Mr. President," said the chief umpire.

Nixon grumbled and mumbled and went back inside the dugout.

Finally, the repair job at the mound was finished. The infielders dispersed and the repairman trotted off the field. Castro stayed at the mound while Raoul made a few practice pitches.

Kee-rist! Now he didn't wind up at all. He just swung the arm around once and fired the ball to the catcher. Faster than ever.

And our batter, Pedro Valencia, had struck out three straight times. Never even managed to tick the ball foul. Not once. Nine pitches, nine strikes, three strikeouts.

I looked at the coach, a couple of feet away from me. No sign. No strategy. I was on my own.

Pedro stepped into the batter's box. Raoul stood up on the mound. His mechanical arm swung around and something that looked like an aspirin tablet whizzed into the catcher's mitt. "*Ole!*" Strike one.

I took a good-sized lead off third base. Home plate was only a dozen strides away. The shortstop took the catcher's toss and popped the ball into the robot's slot.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

If I stole home we would win. If I got thrown out, we would lose for sure. Raoul could keep pitching like that all day, all night, all week. Sooner or later we'd tire out and they'd beat us. We'd never get another runner to third base. It was up to me. Now.

I didn't wait for the damned robot to start his pitch. He had the ball, he was on the mound, nobody had called time out. I broke for the plate.

Everything seemed to happen in slow motion. I could see the surprised expression on Pedro's face. But he was a pro; he hung in there and swung at the pitch. Missed it. The catcher had the ball in his mitt and I was still three strides up the line. I started a slide away from him, toward the pitcher's side of the plate. He lunged at me, the ball in his bare hand.

I felt him tag my leg, and I heard the umpire yell, "Out . . . no, *safe!*"

I was sitting on the ground. The catcher was on top of me, grabbing for the ball as it rolled away from us both. He had dropped it.

Before I could recover from the shock, he whispered from behind his mask. "You ween. Now we have to play another series. In the States, no?"

I spat dust from my mouth. He got to his feet. "See you in Peetsborgh, no?"

He had dropped the damned ball on purpose. He wanted to come to the States and play for my team, the Pirates.

By now the whole USA team was grabbing me and hiking me up on their shoulders. Nixon was already riding along, his arms upraised in his old familiar victory gesture. The fans were giving us a grudging round of applause. We had won—even if it took a deliberate error by a would-be defector.

In the locker room, news correspondents from all the Latin American nations descended on us. Fortunately, my Spanish was up to the task. They crowded around me, and I told them what it was like to live in Miami and get the chance to play big league baseball. I told them about my father, and how he had fled from Cuba with nothing but his wife and infant son—me—twenty-three years ago. I knew we had won on a fluke, but I still felt damned good about winning.

Finally the reporters and photographers were cleared out of the locker room, and Nixon stood on one of the benches, a telegram in his hand, tears in his eyes.

"Men," he said, "I have good news and bad news."

We clustered around him.

"The good news is that the President of the United States," his voice quavered a little, "has invited all of us to the White House. You're all going to receive medals from the President himself."

Smiles all around.

"And now the bad news," he went on. "The President has agreed to a series against a Japanese team—the Mitsubishi Marvels. They're all robots. Each and every one of them." ■

● God doesn't want to make it too easy for His children—many of them are spoiled enough already.

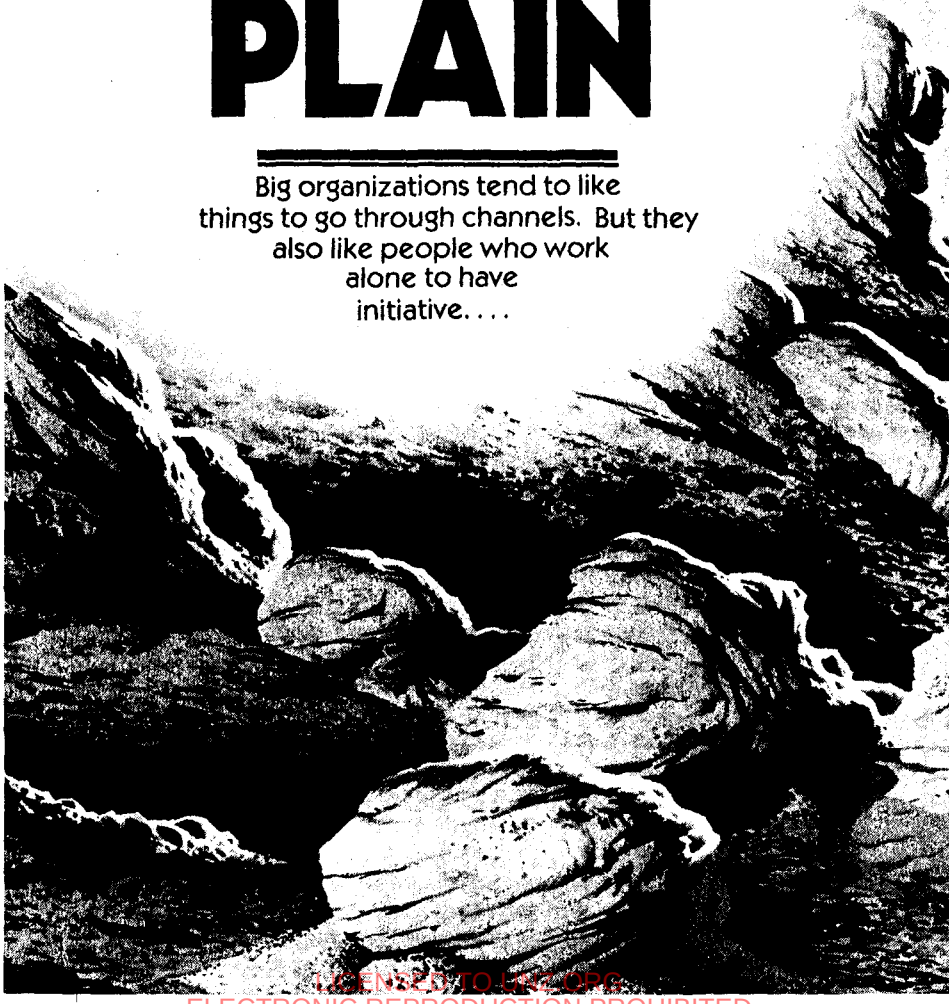
Kelvin Throop III

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

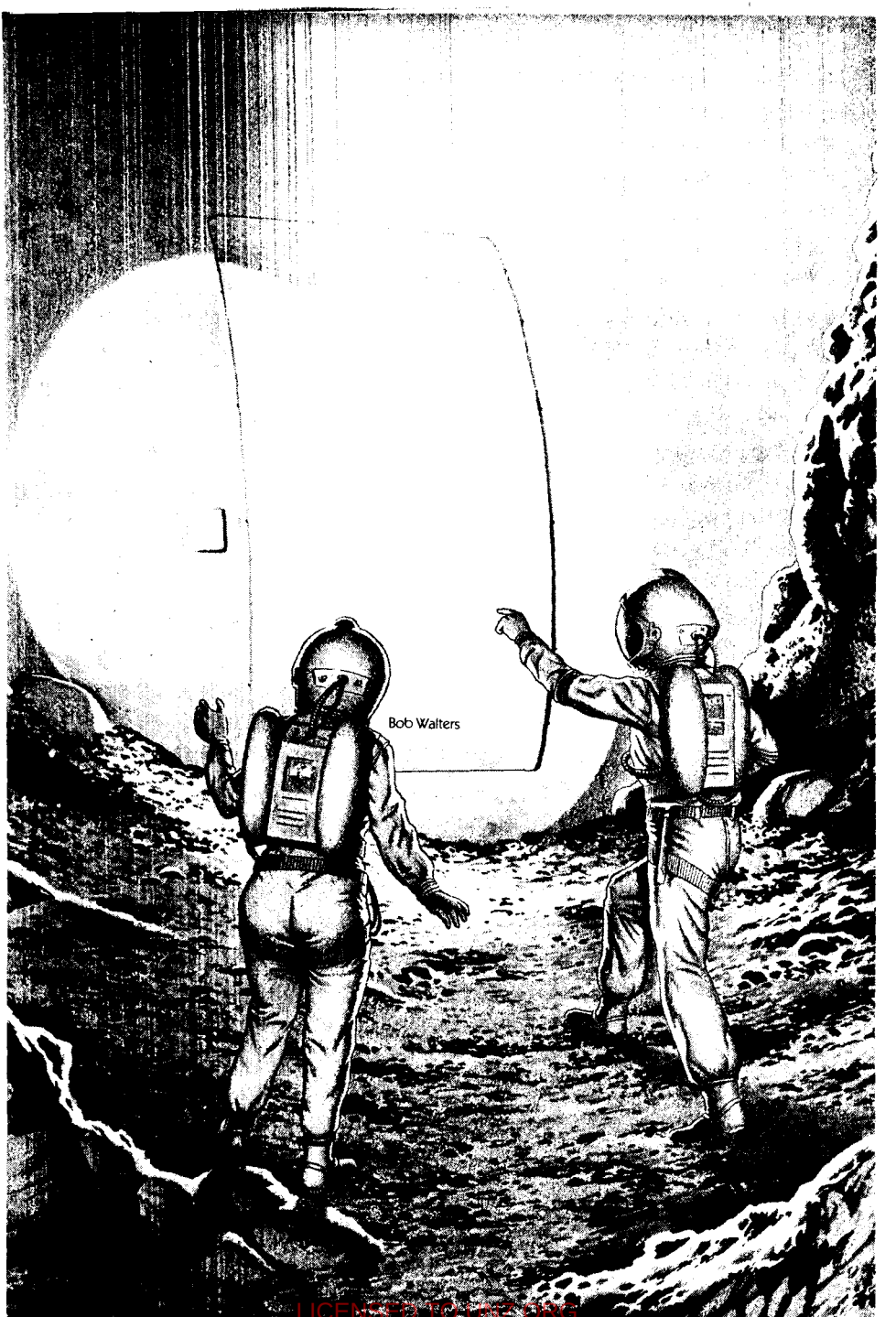
P. M. Fergusson

THE DARKLING PLAIN

Big organizations tend to like things to go through channels. But they also like people who work alone to have initiative. . . .



LICENSED TO LIVE.ORG
ELECTRONIC REPRODUCTION PROHIBITED



LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

I

"Behold the darkling plain.
Wherein the mind of man resides.
Across its rainbow sands
his spirit blindly strides,
Unable to comprehend
its own infinity."

"Oh, James, I like it. Isn't that Matthew Arnold?"

I took a last glance at the darkling plain of Luna flowing slowly past under Gertrude's two-meter-wide tracks. I rolled over to look at the bright smile of Gertrude's alter ego. "No my dear robot. It's James Carter out of Basho as inspired by Mr. Arnold. What you're thinking of is Arnold's 'Dover Beach': 'And we are here as on a darkling plain
Swept with confused alarms of struggle and flight,
Where ignorant armies clash by night.' "

"They're both nice—but I like yours better. What's it mean?"

That's one of the things that fascinates me about Gert; as a computer she's ultra smart but as a person she can ask the damndest questions. "Uh . . . Well . . . Darn it, Gert, you can't really explain poetry. You sort of have to uh . . . experience it."

"True, James." Gertrude told me gently and gave me a kiss on the nose. "But it's a human's experience, not a computer's. How do you expect me to learn human experience if you don't explain? For instance, how can a dark plain have rainbow sands?"

I shouldn't have laughed, but I did, and earned a short left in the solar plexus. When I caught up with the breath that had left in such a hurry, I said, "That's the easiest part. Look at the plain we're crossing now. Use the human visual band."

Gertrude-the-robot's eyes closed and I knew that Gertrude-the-computer was using her externals to scan the area. The eyes reopened and she said, "It's mostly dark grays and blacks. Earthlight doesn't give much illumination."

"Right!" I told her. "Now look at the same plain using the full spectrum of all your sensors—Infrared through however high you can go beyond ultraviolet."

"Clear through the radio spectrum?"

"Sure, if you can get a single coherent image."

"I can." she said, and her eyes closed again.

A second later they flew open. "Oh—my—God!" she breathed.

Look mate, I have scanned the supposed gray of Luna under both IR and UV. It is spectacular enough to give me a tiny hint of what Gertrude must have seen with her full spectrum abilities. If you think I didn't feel slightly envious, you're nuts.

"Those, Dear Robot, are rainbow sands that I will never see—in fact, can just barely imagine. The human mind is the same way. We exist in a realm of infinite possibility. Our minds can *conceive the most marvelous things if* they are given the chance. But they rarely are. Not only does our consciousness shy away from the vastness, but our ego limits what we see at our very feet to shades of gray. A very, very few artists, poets, scientists, and other social ne'er-do-wells manage to crack their shells. But they are so very rare and the cracks so very small . . ." I let the sentence trail off in frustration.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Gertrude held me and said softly, "I know, darling. But look at it this way: maybe it's a needed protection, with colors so brilliant and light so intense even the tiniest opening makes a big impression. I think only God could survive complete exposure."

It was a good thought and it helped. I began to recover my sense of the absurd. I grinned at Gert and said, "You seem to see a lot more than I do, Gert. *Deus ex machina?*"

"Not hardly, you irrepressible egotist. Now, get dressed. We're almost at the job site, and it's time to go to work." She hopped off the bunk and headed for the galley, grabbing and donning pieces of female ensemble as she went. For a computer, Gert is quite a woman.

Well, not just a computer either. Gert is sort of a multiple personality. One part of her is a smart blade, one hundred and eighty tons of computer controlled Lunar bulldozer. Another part is bio-electronic robot—we usually call them bio-analogs—redheaded, lux figured, and to all intents and purposes, very much a female. But the heart of Gertrude is the computer.

Yeah, yeah. I know what the textbooks say. Computers can't be self aware or have personalities; they can't even be truly intelligent, only so fast they seem that way. But those textbooks are talking about digital computers, or ULSI analogs, or hybrids of the two. They're not talking about a biosynthesized analog like Gert.

Gert's operating circuits are composed of synthetic DNA, and they can grow and interface just like yours or mine, maybe better. Gert says she hasn't found any limit to how much memory she can add, particularly if she maintains it as small discrete units connected by superconductor.

Don't ask me; I'm no computer expert, and bio-engineering could be hieroglyphics for all I know about it. However, Gert's humaniform analog is built of the same materials you and I are, and was engineered to be as human in physical appearance and behavior as technology would permit. Gert herself, with the aid of Luna's central computer banks, has quietly continued to improve the design to include most human biological functions as well. Only the brain remains separate. Where a human brain would normally be is a very sophisticated set of receiving gear and Bio-RAM that connects the analog to Gertrude the computer.

So much for the textbooks. If Gertrude isn't a self-aware personality then neither am I.

"Lunch, Jim," Gertrude's voice came from the galley. "First we eat—then we work."

"OK, slave driver." I told her as I hoisted myself off the bunk.

I was standing on one leg, pulling the pressure suit over the other when a sudden lurch tossed me back onto the bunk. "Hey! What was that?" I yelled.

"Sorry, dear," Gert's voice called back. "I hit a soft spot."

"Are you working already? I thought we were going to eat first."

"Oh, it's no trouble to get lined up for the first cut while we're eating," she explained.

Wonderful, I thought. A woman who can do two things at the same time. A second later I realized it wasn't so unusual after all. If you don't believe me,

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

watch any woman at a cocktail party carrying on two completely different conversations at the same time—or a mother, simultaneously shopping and keeping small kids in line. Hell, Gert was just being feminine.

An hour later I was slouched in the command chair, drinking coffee and watching the cut monitors. Gert was seated at a computer console analyzing the data from the sonic probes and computing the most efficient cut configuration. She could do the job just as easily, maybe more so, in her main memory, but she says it's better than standing her alter-self in a closet and shutting it down. Says it makes her feel more useful too. Don't ask me to explain it—I'm not a woman.

Anyway, I don't object. In fact it's kinda nice just having her nearby. Uh . . . You know . . . Saves me having to make my own coffee . . . and things like that.

This particular job was preparing the foundation for a new dome. Not a particularly large one, maybe three hundred meters by a hundred and fifty, probably meant for some research project. They don't tell me what it's for, just what to cut and where.

Since we were cutting for a base at almost twenty meters depth, we were working with a robot hauler on this one. We'd cut and pile up a load with the blade, then reverse ends and load the pile into the hauler with the skip shovel. The hauler takes it up the ramp that spirals up the side of the pit and dumps it around the rim. When the dome is installed the trash will be bladed up over the seal and around the margin for extra stability.

A no-sweat job, right? Just cut, pile, load, and dump. Not for us. With me and Gert, no matter how uncomplicated the job we're doing, something always seems to go screwy.

This time we were finishing edging the bottom, preparatory to starting the first of the housing tunnels, when our luck caught up with us.

Gert stared at the plot on the computer screen and pointed to a highlighted section. "Jim, there's something odd about this batch of soundings. The data says there's a large metallic object, or a vein of almost pure metal, about three feet into the wall."

I stared over her shoulder and thought for a while. Not again! . . . Why not, Jim boy? You know Murphy has it in for you. Couldn't he slack up, just once? Dumb question. Maybe it's just a large ore pocket. Maybe its nothing but a glitch. Maybe it's a can of peanut butter the Jolly Green Giant lost. I have a sarcastic subconscious.

I gave up on the internal dialogue and said, "Well, I don't question that it's unusual, but it's probably just a large meteorite. They've found a couple of good sized ones in other craters."

"Not that big." Gert replied. "Nowhere near that big. And we aren't near any known craters."

"Maybe it a real old one, and the crater features have been obliterated by subsequent strikes."

"James." Gert never calls me James unless she's irritated with my reasoning or being sentimental. Somehow, I didn't think she was in a sentimental frame of mind. "A meteor the size of that thing on the plot, if it hit at anywhere near the speed you would expect, would have

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

made a very, *very* large crater. You just don't obliterate the evidence of a strike that big. Not and find the meteor within fifty meters of the surface."

I couldn't argue the logic. To recoup I said, "It's no good arguing on insufficient data. We're going to find out what it is when we start digging. It's right in the middle of where we're supposed to run a tunnel."

Gert gave me a dirty look and said, "You're insufferable when you're right. I'm the computer. I'm supposed to say things like that."

"Yes, but you're also a woman. That makes you inherently illogical." I gave her a smug grin to emphasize the point. Not wise, but satisfying. I don't get an edge on Gert very often.

"Shut up," she told me, "and start loading the charges before I pour a pot of coffee over your male superiority." She handed me the data and flipped herself back to the computer.

A typical feminine response to being one-upped, I thought. But I started loading. I much prefer my coffee inside me.

It didn't take long to discover that our mystery object was no meteorite. The second set of charges exposed a dull metallic surface, definitely not natural, and indefinably alien. Toad squat! Murphy had done it again.

"No human ever made that thing, Gert," I told her.

"Don't jump to conclusions, Jim," the computer side of her nature lectured. "We don't know what it is yet. It may just be the oddness of finding it here that gives that feeling." Her growing human side added, "I think you're right, though."

I took a deep breath to quiet the butterflies and suggested, "Well we won't find out any more by sitting and staring. Shall we uncover the rest of it?"

"I'd go nuts from curiosity if we didn't," Gert said as she started to roll.

It took two days to expose the object, a flattened teardrop of dull gray metal, about forty five meters long by five high by ten across at its widest. The pitted and blackened vents at the narrow end left little doubt as to its nature. It had to be a spacecraft of some sort. An access port, two meters high by one wide, was clearly marked about two thirds along its length.

"Well, whoever built this thing was about our size." Gert said. "The size and shape of the port proves that."

"Yes, but who were they? What did they look like? The shape of the port doesn't tell us anything about that." I paused and continued to stare at the screen. One doesn't encounter alien spacecraft every day and it made me more than a little nervous.

"A more important question," Gert said in a hushed voice. "Where did they come from, and still more to the point, where are they now?"

"From the asteroids," I said, "before they were the asteroids?"

Gert gave me a frustrated look. "James, science fiction notwithstanding, there is no evidence that the asteroids were ever a planet. Besides, I don't think that ship is near old enough."

"Gert, there is no evidence of any other intelligent life form ever having existed in this solar system. Let alone a space faring one." I paused to let the implications of that statement seep in. "The only other alternative scares the whosis out of me." I concluded.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Me too." Gert said, "But you really didn't believe we could be the only intelligent life in the universe, did you?"

"No, but I had sorta hoped for a galaxy to play with. Anyway, wherever that ship came from I'd bet it isn't intergalactic. It's just not big enough."

Gert gave a snort and said, "Just how big is an intergalactic ship?"

"Uh . . . I guess it would depend on the means of propulsion—how long it took to get from point to point."

"And how long is that, Jim? What means of propulsion does this ship use, exactly?"

Gert was goading me, forcing me to peek through the crack and look outside my shell. *I* was looking for a set of blinders. "Sorry, sir, we're fresh out of stock," my internal imp commented. "There's an election coming up, y'know."

"I don't have the foggiest," I finally admitted. "By the rules of accepted physics, this ship is too small—by far—to carry enough supplies to make it from even the closest star. Unless it came from a considerably larger mother ship."

"Which just abandoned it here? Really!"

"Doesn't make much sense, does it?" I was waffling and I knew it.

"So shall we report this find and get some help?"

I took a long time to think before replying.

"No . . . I don't think so," I finally said, "At least, not right now. For all we know it may be some elaborate hoax."

"A hoax, buried almost twenty meters deep under lunar rock?" Gert's voice sounded like a wife whose hubby is trying to explain why he's late and smells like . . . you get the idea.

"Unlikely, I admit. But not impossible." I was reaching, so I paused to take another look at the possibilities. I didn't like any of them. Finally I suggested, "It could be some mislaid government project."

"So what do we do, Jim, haul it off and rebury it?"

I finally found something to smile about. "You've got to be kidding! Curiosity would kill the both of us."

Gert grinned back at me. "So, let's suit up and investigate, shall we? Time, tide, and insatiable curiosity wait for no man—or computer."

II

The center of the marked hatch held a panel which, after a moment's experimentation, slid aside to reveal a large green button.

It was too easy. "It's almost as if they expected someone to find this. I wonder . . ."

"I imagine they did." Gert interrupted. "So let's not disappoint them." She reached out and pressed the button before I could stop her.

The hatch began to cycle open even as I dragged her back.

"James! What are you doing?" She struggled to keep her footing as I pulled her well out of the line of the opening hatch.

"Gertrude, you are awfully smart as a computer, but dumb as hell as a person. When sentient beings, human or otherwise, hide things they frequently protect them against unwanted intru-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

sion! In other words, they booby trap them."

"Oh." Her voice sounded very small.

"Damn right, *Oh*. This whole thing is going too easily. It makes me nervous as hell. I keep waiting for the crash."

Gert looked at me for a moment. She was beginning to recover. I could see it in her face through the helmet port. "I was wrong. I should have been more cautious. But the hatch is now open. What do we do, stand here and stare at it?"

"No. But can you wave a probe of some sort around in there?"

Gert thought for a moment, then her super blade self rolled up to the hatch and extended a number of sensors through the opening. "I get some sort of power reading, Jim, but that's all. No hidden weaponry that I can detect."

I didn't like it, but we weren't going to get any further just standing and staring. "OK, let's go. But carefully, huh?"

"Yes, Jim." she told me and her blade self pulled back.

We stepped into the lock. It was about three meters square and two and a half tall. There were racks along one wall—possibly for suits or supplies—who knows. They were empty now. Opposite the entry hatch was another. This one had a red button in its center.

I said, "Wait," jumped back out, and got a two meter long probe rod from our tool room. "Stand over against the racks," I told her when I returned. When Gert was in position I used the rod to press the button, from what I hoped was a safe distance.

The outer hatch began to cycle almost immediately. It closed with a solid thud that we could feel through our boots. Our suits began to collapse as atmosphere filled the lock. The button on the inner door turned amber, then green. I glanced at the outer hatch and saw that it had a matching button on the inside. It was red.

"Nice," I commented. "Control and indicator in one unit. But I'm liking this less and less."

"Why, for heaven's sake?" Gert asked in true puzzlement. "There's been no threat. Not even the tiniest hint of one."

"I know, dear. But how come the color of those lights matches our system of stop and go signals? It's exactly as if they expected this ship to be entered by someone from Terra when they put it here. If so, why?"

Gert grinned at me. "Interesting puzzle, isn't it?"

"Yeah. But I'm not much for puzzles that might cost me my life." I walked back to the outer lock. "Let's go back to the blade and think about this a little more." I pushed the button on the outer lock. Nothing happened; no inflation of the pressure suits as atmosphere drained, no hum of hidden machinery, nothing. I waited for a bit and tried again. Still nothing. "Uh-oh." I said.

"What's wrong?" Gert asked.

"I don't think our friends want us to leave. The outer lock isn't working." I paused, looked at Gert and said, "Look, have your blade self push the outside button with one of her probes."

Gert's eyes closed for a second then opened again—very wide. "I can't." she told me quietly.

I was in no mood to be kidded. "Wadda you mean you can't!" I

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

barked—a lot more harshly than I intended. I'm no hero and I was starting to be more than a micron's worth of nervous.

"I mean just that. I can't. I can't talk to the blade. There seems to be some sort of RF dampening field in operation. My communications are cut off at the hull."

I stared at Gert while I floundered around inside my brain. Brain! That was it! Gert didn't have one. At least, not in the bio-analog part of her. How come she was . . . "Then how come you're still standing there and talking to me? Why aren't you collapsed in a heap or something?"

"Oh!" she said brightly. "I guess I forgot to tell you. I made a few other modifications when we were in for service. I figured someday I might need to operate each of my units independently, so I put enough capacity in my skull to handle personality and a reasonable amount of data. I was waiting to check it out before I made a big thing of it."

"Wonderful!" I was shifting between gratitude and resentment. She could have warned me. I muttered, "Thank God it works." and grumped "Shall we get on with this?"

Gert didn't say anything, her eyes were unfocused, and she was shivering.

"Gert? Are you OK?"

There was no response except that she shivered harder. Great! Maybe her preparation hadn't worked after all.

"Gertrude! Say something. Are you all right?"

Her eyes snapped into focus and her face twisted with some internal agony. "Oh, shut up, James!" She took a deep shuddering breath. "Yes, I'm all right." Her expression changed. "Oh God! I'm sorry. I didn't mean that. But, I'm all right." Then she started to cry. "No I'm not. I mean . . . Oh God . . . I don't know what I mean."

She collapsed against me, shuddering as uncontrolled sobs shook her. I fought down panic and said, in as calm and controlled a tone as possible, "Gert. It's me. Remember me, Jim? Try to tell me what's wrong."

I could feel her fight back to control. "I didn't mean to scream at you. I'm really sorry."

"It's OK, Gert. Don't worry about that. Just tell me what's wrong. Then maybe we can both deal with it. Two heads, et cetra." I tried to give my voice a light confident note that I didn't feel.

"That's part of it," she hiccoughed.

"What's part of it?"

"I'm not Gert. I'm not me anymore."

That brought me up short in a hurry. I stammered around in my mind for a second, got myself under control, and asked, "Could you explain that?"

Gert was coming back to normal faster than I was. Her voice was perfectly calm as she explained. "James, I have lost over half my sensory input. I am now totally dependent on what you call the five senses. I can hear, but only with my ears in the 30 to 25,000 cycle range. I can see but only with my eyes. I can't even get beyond the infrared and ultraviolet."

I was tempted to tell her just how far beyond *my* abilities this was, but I restrained myself. A smartass comment like that would've been no help at all.

She went on, "I can smell with my nose. I can taste with my mouth, I can

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

feel with my skin. That's all! Worse! I can't even think right. Most of my data base is gone. I keep looking for things in my memory that I know should be there, and they aren't. I've forgotten!"

"Welcome to humanity, darling. Those are things we mortals have to deal with every day."

"I know. But it's disturbing — confusing. I've never been confused before!" Gert paused, and took two deep breaths before she continued, "I don't even feel the same emotions—or at least not in the same way. They're more intense. Before I could control my emotional responses with no effort. Now it's a war between my logic and my feelings. I'm not used to that. You have no idea how confusing it is."

"Gert, most humans have that problem. It's normal. Limited capacity means limited control. You've gone from comparatively unlimited memory capacity to the level we humans have to function with every day. Relax and don't let it worry you. You'll get used to it."

"Yes. Probably. But I really don't think you comprehend how horrible and unsettling it is. Imagine that you suddenly were limited to monochrome vision, could hear only low notes, and couldn't remember what you had for lunch two days ago. That's a fraction of what it's like for me."

I generally can't remember what I had for lunch yesterday—let alone two days back—but I got the idea. I looked for another, more stabilizing subject. "Maybe if we go on, we'll be able to get back in contact with the rest of you."

"Oh God, James. You'll never know how much I hope you're right."

I gave Gert a hug and pressed the button on the inner hatch. The lock cycled and we were staring into a passageway painted in pastel blues, greens, and tones of brown. A passageway lined with closed doors. Beside each door was a glowing panel—all but two were red.

Doors closed the hall at its ends. Each was guarded by a glowing red panel. I made a bet with myself that they led to an engine room to our right and the control room to forward. I was to discover later that I was only partially right.

"Gert, I have the feeling we are being led. That our absent friends who own this thing are going to show us not one thing more than they wish, and that in their own good time."

Gert gave me one of those smiles that says *what a darling bump you are* and patted my hand. "Of course, dear. Wouldn't you do exactly the same thing if you wanted someone to learn things in a specific order?" She smiled again and added, "I get the distinct feeling they are trying to develop our confidence in their good intentions."

"And I get the distinct feeling we should have reburied this thing and forgotten it," I grumped.

"Neither of us could have stood the mystery. And you know it."

Damn, I hate it when she's so blatantly right. I shrugged and headed for the nearest green panel. I was madder at myself than at Gert, but the result was the same. I simply stomped up to the door and slapped the panel—to hell with the consequences.

There was no mistaking the room's function. A neat bunk, designed for someone about two meters tall, occupied one wall. There were closed stor-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

age lockers above it. I checked them. They were empty. A desk with what could only be a comm screen occupied the wall to our right. It showed a three dimensional view of the hallway, I could see Gert looking over my shoulder. The picture moved as we did—laser holography?—a neat touch whatever the technique.

The wall to our right contained strange but obvious sanitary facilities: sink, lavatory or bidet—there were several unfamiliar openings and controls—and what appeared to be a very standard shower. I opened the mirrored cabinet above the sink. To my surprise it contained an apparatus that was both familiar and strange at the same time. It was a rod about ten centimeters long joined to a comfortably shaped handle. I had a good idea of what it was, and I couldn't resist trying it. I pointed it away from myself, in case I was wrong, and pressed the button on the handle. I sensed, rather than felt, a faint vibration—so far, so good. I moved the tip near some dust on the sink and watched the particles began to dance. I grinned at myself in the mirror, moved the tip towards my teeth—and jabbed myself in the face plate. Damn!

"Jim! Whatever are you trying to do?"

Double damn. Gert had seen my boob maneuver. "Trying to brush my teeth through my faceplate—like any normal idiot." I grinned, trying to improve the situation by making it a joke.

"Mmph." Gert said noncommittally. "Did it work?"

Some women have no sense of humor.

I put the device back on the shelf and said, "Shall we try the next open door?"

Now she was grinning. I saw it clear through the back of her helmet as she walked out the door.

The next room was unmistakably a galley. Stove, sink, and cabinets; all familiar, and still alien. The cabinets in this room were locked. Ah ha, I thought, no free lunch on this trip. I tried the sink and jumped when moving a slide bar produced a stream of what appeared to be hot water. A moment's experimenting showed how it worked. Back to front equaled off to hard on; left to right changed temperature. Too human-normal to be believed. There was a comm screen in the galley too, but this one showed the room we had just left.

There was a row of marked, finger-sized panels below the screen. One about midway in the row was lit. I hit the one on the far left. I didn't expect any results, but I had to try. I got the shock of my life. I was looking into the engineering area.

The why of this ship being here became immediately apparent. Odd/familiar tools were visible in open chests. Almost identifiable apparatus stood randomly about the floor—left in place when the user had finished with it. The room was a hodgepodge of apparent damage and hasty repairs. The repairs were neat and well done, nothing careless, but hasty none the less. How did I know? Easy. I've done the same kind of work myself. Anyone who has worked on the Lunar surface for any length of time, and is still alive, has done exactly that kind of work.

The whole place yelled, "we've done

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

what we can and it still don't work—now we wait for help."

I got a crawling sensation between my shoulders. Where were they waiting? And, who was coming to help?

I pointed at the screen and verbalized my thinking to Gert while she looked the scene over.

"I think you're right, Jim." She paused and went on, "And I think they're waiting somewhere on this ship—if they're still alive."

I had to take a deep breath before I could get out, "But who are they waiting for?"

Gert has the nasty habit of grinning at times when I wish she wouldn't. She did now and said, "Why, for us, dear. Shall we get on with the rescue?"

I don't recall exactly what I said, but, it was long, logical, impassioned, involved our getting the hell out of there as soon as possible, and was totally ignored.

Gert let me rant while she pushed each of the other buttons in turn. They showed other living quarters, an identifiable recreation area, a store room—for food, I think—another store room, the entry lock, and the control room. The last I won't even attempt to describe in detail. It had seats for three beings. One seat was built in a shape no human could fit comfortably. There was a multitude of screens, all of which were blank, and a lot of indecipherable control panels.

Two buttons on our comm screen remained dead.

Gert shrugged and said, "End of lesson one. Let's find lesson two."

Wonderful! I thought. We're stuck on an alien space ship, and she wants to go back to school.

Gert headed out the door. Having nothing better to suggest—or do, since it's hard to chew your fingernails in a pressure suit—I tagged along.

Because I kept looking over my shoulder, I ran into her when she stopped. So much for being macho.

Gert was pointing at a door, near what I guessed was the control room end of the hall. I looked and cursed under my breath. We had a new green panel.

Gert pressed the panel—with a lot more caution than she had previously evidenced, I was pleased to note—and we both peered through the door.

The room contained three desks with built-in chairs, closed cabinets, and a lot of control panels and screens I didn't even pretend to understand. It also contained a chair over which some sort of helmet dangled from a thick cable. It looked out of place. It had the same hastily assembled, do-with-what-you've-got appearance as the repairs in the engine room. It had been obviously constructed with the human frame in mind.

I carefully lifted the helmet and looked inside. It looked back, blank, and empty. I shuddered; the whole thing looked too much like an electric execution device I had seen in a museum once.

I released the helmet, walked toward one of the control panels, and banged into an invisible barrier. I got the word: the controls were not to be touched—the chair was OK. I didn't like the implications.

While Gert was examining the chair, I looked back into the hall. No additional panels had turned green. This was lesson two. Damn!

When I turned around Gert was look-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

ing at me. "Standing here isn't going to get us any further," she said and reached up to her helmet seals.

"Hey!" I yelped. "Wait a minute. We don't even know if the air in this place is breathable."

She gave me one of her teacher-knows-best looks and reached behind her back. Her hand reappeared holding the air analyzer. "Earth normal." she told me. "I checked it while you were investigating the toothbrush."

Damn! Why hadn't I done that as soon as the lock filled? "OK, but I better go first," I said while still mentally kicking myself.

Gert hesitated then said, "Uh . . . Jim. It seems safe enough, but, just in case . . . my system will survive better in a hostile environment than yours. Maybe I'd better go first."

"What hostile environment? I thought you said the reading was Earth Normal?"

"It is. But, there are a few biochemical components that I'm not familiar with. The analyzer says they're harmless but, like you tell me so frequently, never trust a mechanical device."

I was ready to argue. "But—"

"Jim." she interrupted. "Even if this body gets killed, it can be repaired, and my personality still exists, unharmed, in the computer. Please."

I'm not fool enough to combat that kind of logic so I nodded—but I was damn well ready to cram her helmet back on and activate its flushing system at the first sign of a problem, mentally thanking the bright engineer who had designed the suits so that removal of any individual section (legs, arms, or helmet) sealed the rest of the suit and prevented total system pollution. At least all I'd have to worry about was clearing her helmet. To be truthful, and ego be damned, I wasn't sure I could get out of this without her.

Gert removed her helmet, sniffed cautiously, waited, then took a deep breath. After a few moments she shrugged, "Smells funny, but I'm not having any adverse reactions."

"Funny how, Gert?"

"I'm not really sure, never smelled anything like it; sorta pleasant, actually."

I began, "What the hell. Nothing vent—"

Gert interrupted my cliche. "Not too original, dear, for a poet."

Flattery will get you everywhere. I shut up and unsealed my helmet.

Like Gert I sniffed cautiously. Unlike her, I grinned hugely and took the deepest breath I had taken in years. Shades of Sydney harbor! The childhood memories flooded in, borne on the tang of the ocean: white sails skimming between a blue sky and a bluer sea, sea shells peeking through hot sand, and lobsters consumed beside driftwood fires under the Southern Cross. Whatever else this ship had, it's air conditioning was a dilly.

"Lord. that's bloody wonderful! That, Gertrude my dear, is what the bloody ocean smells like. All that's missing is the sound of surf.

I went one meter straight up and every hair stood on end as a soft susuration of surf came from nowhere in particular. "What the bloody hell is going on?" I yelped.

"Easy Jim," Gertrude said calmly. "I think we're being monitored by a

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

very well programmed computer. You wanted surf, you got it. This ship is trying to put us at ease."

"Maybe, but I wish the bloody thing wouldn't do it so bloody abruptly."

"Your accent is showing, dear."

I stopped talking with my mouth hanging. Gert was right. I hadn't used Aussie slang for ten years or better. I would have thought that twelve years of living in the North American Federation and four years on Luna would have flushed it completely. It hadn't. The human mind is a funny thing. Childhood memories, childhood tongue.

While I was dreaming, Gert was sitting.

"Hey! Wait a minute."

Gert gave me one of her patient looks. "Same arguments, Jim? Same answers."

Sometimes, there is just no arguing with that woman.

I watched as she slipped the helmet on. For a moment she looked pensive then said, "History lesson," and closed her eyes. She stayed that way for nearly twenty minutes, while I enjoyed the sea air and pleasant thoughts. Then, without any preliminaries, she opened her eyes, removed the helmet, and stood up.

"And?" I asked.

"It would take me hours to recap, Jim. That apparatus works directly on the mind. I'd call it a thought transmitter if I believed such a thing were possible, or it could be computer operated." She handed me the helmet. "You'd better take the lesson yourself."

I took the lesson. Like Gert said, it would take hours to recap in detail. But in essence, when it was over I had a good overview of a star-spanning political organization called the Ionian Federation, a loose union of several thousand diverse cultures and races under a central government. A government whose individual members were elected, appointed, or hereditary according to the cultural preference of the member races. The government defended the Federation, arbitrated internal disputes, and explored new planets, easing their entry into interstellar civilization—or preventing it.

The ship we were on was an exploration scout with a three man(?) crew.

I watched, if that's the right word, as an intermittent protective screen kept forcing the ship out of whatever mathematical abstraction it entered to travel faster than light. I watched the shutdown to replace the failing component, the replacement, the reseal for test, and the something that tore through the undefended hull destroying both the unit under repair and the transmitters to call for help.

It was a strange feeling, like having someone else in control of your body while you watch yourself. The hasty repairs, the slow run into our solar system on sublight drives, the survey of the system—planet by planet—looking for a civilization that could manufacture replacement parts; all seen from the viewpoint of the person performing the tasks.

I performed the survey, located high-tech civilization on the third planet, and felt the frustration as I observed the war raging across its surface. From my own school days, mine, James Carter's, not the alien observer's, I recognized World War II. No, there was no help there—at least not right then.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

I buried the ship on Luna. I built the chair. I felt the faint hope that these savages might reach the Moon and find the ship, before they blew themselves to hell-n-gone. I stepped into the stasis box that would keep me alive for however long it took. I watched the sick bay shelves fuzz in outline as the transparent door swung shut.

I lifted the helmet and stared at Gertrude.

"Jim, Are you all right?"

"Yeah. But, I sure'n hell wouldn't want to do that for a living. Half the time I couldn't tell which was me and which was whoever."

Gertrude gave me a weak grin. "I know. That's quite a way to get a message across. I guess I should have warned you, huh?"

I grinned back at her. "It would have been nice, but it might have dulled the effect. It was an experience I wouldn't have missed for anything—once."

I stood up and stretched. "It's funny though . . . I saw . . . no, I experienced all that, and I still don't know what the crew looks like."

Gert nodded at the open door. "I think that's going to be lesson three. We have another green panel."

III

Although the room bore as much resemblance to the medic bays I was familiar with as ours do to a seventeenth century surgery, it had that same hospital feel. There was less exotic apparatus than I would have expected, and what there was could have been dishwashers for all I could tell. The minor features of the room were noticed only in passing. The three stasis boxes and their occupants drew and riveted our attention.

At first, I thought two of those occupants were human, a man and a woman. (I use the terms man and woman for convenience since I didn't find out for sure that the terms really applied until later.) A closer look showed they were definitely *not* human. The hands and eyes gave them away. The hands were five-digited, but in place of the little finger was another opposable digit—a second thumb. Another small detail that said *alien* were the clothes: nothing you could exactly pinpoint but you knew, nevertheless, from both the cut, which left no doubt as to sex, and the shimmering pale blue fabric, that they never came from our solar system.

If the hands made me nervous, the eyes gave me the running jumps. They were open, which I should have expected but didn't; larger than human, they had cross-slit pupils, like the cartoon drawing of someone unconscious. I could have sworn they were staring at me. I knew, intellectually, that they weren't aware of anything. They were locked in a present almost two hundred years old.

But that atavistic primitive living just below my culturally imposed sophistication wasn't at all convinced. (If you consider yourself sophisticated and want to feel like a real nit, look up the derivation of the word sometime.) In fact, he was screaming at the top of his mental lungs for me to get the hell out of there. If I hadn't been more scared of appearing a total ass than I was scared of the aliens, I would have taken his advice.

Instead I took a look at the third box's

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

occupant. It was human size, had a very human face and head, and was bilaterally symmetrical. That was the end of the similarities between it and genus *Homo*.

I pointed at the third box's occupant. "Gert, what is that?"

"Intelligent," she said succinctly.

That almost stopped me, but I managed to plunge ahead. "Yes, no doubt, but what species?"

"I doubt that it is even remotely classifiable in terrestrial terms," Gert stated, "All I can guess is that it is carbon based and oxygen breathing. Beyond that, I would guess that the split from any terrestrial life form started somewhere around the amoeba or volvox, or maybe hydra level." She shrugged, "I wouldn't even bet that any of these people are warmblooded, or that such terminology is even relevant. Why should it be?"

She had me stumped with that one. Obviously she was right. You can't apply terrestrial biological concepts to total aliens.

I continued to examine the *alien* alien. At first I thought it had an exoskeleton, then I thought it was plated like a rhinocerous, then I gave up guessing. It had ten limbs which terminated in opposed pincers. Two were apparently for walking, bipedal locomotion, the pincers were stumpy and splayed like toes. Six of those appendages appeared to be for manipulation. The pincers varied in size from human hand to barely a centimeter long. The arms(?) were multiple jointed, and, I was betting, could swivel in any direction. Talk about potential for delicate manipulation. The top pair of limbs was something else. Heavy, armored, and triple jointed, terminating in huge claws that were almost as long as the torso. The claws were vaguely the shape and proportion of a praying mantis. This was one alien I would hate to have angry with me.

The face, though, was the real shocker. If a politician had looks like that he would get the vote of every woman in the solar system—a Greek god should be so handsome and serene looking. Rather than detracting from the alieness, it accentuated it. In fact, it gave me the shivers. Weird, insectoid creatures shouldn't have human faces. I turned back to studying the others.

I stalled as long as I could, but I finally had to ask the big question, "OK, Gert. Now what?"

For once even Gert paused before making a decision. At last she shrugged and said slowly, "Pick a case and open it—I guess."

"I love it when you sound so positive, Gert. Are you sure you really want to do this?"

"You have a better idea?"

Ignoring the rash of suggestions my primitive side was making, I didn't. I took a long look at the alien alien and decided I wasn't ready to go quite that far along the road to galactic equality. I pointed to the female. "Her, I think," I almost added that we stood a lot better chance of physically handling the situation if it went sour.

There was a green button on the side of each of the boxes, Gert reached toward the one on the woman's.

"Wait! Helmets on first! We don't know what the atmosphere in those boxes is like."

Gert nodded. "It's probably not

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

harmful, but you're right. There's no sense in taking risks."

Helmets sealed and checked, Gert pushed the button.

For a long moment nothing appeared to happen, then the woman blinked, looked at us through the clear cover of the case, smiled and with a nod pushed the cover open. When the cover was fully open she stepped out and said something in a language that sounded vaguely like Chinese but wasn't.

"Sorry, lady, I don't understand you." I told her and tried to smile encouragingly.

"Good'o!" The woman said. "A Yank. I was right. You *were* the ones to develop space flight."

The accent was so blatantly Sussex I had to laugh. My laughter got a dirty look from Gert and a puzzled one from the alien. "Sorry, miss." I explained, "I just didn't expect someone from . . . uh . . . another solar system(?) to sound so . . . uh . . . bloody English."

The woman stared at me for a moment then, surprisingly, blushed. "I'm awfully sorry. You're Australian, aren't you? I know national loyalties play an important role in your culture, I hope I didn't insult you."

Gert giggled, and, with that weird empathy that one woman sometimes displays with another who is a kindred spirit, said, "You couldn't, dear. He's positively uninsultable."

Oh great! I thought, now I have to deal with two of them. I turned toward the man's box. I was damned if I was going to be outnumbered. Outgunned, maybe—outnumbered, no.

I was brought up short by the woman's voice. "Nice touch, Ergin. I like the sea smell."

"Thank you, Ma'am." a voice said out of nowhere, making me jump. "I thought it might be relaxing for everyone."

"It is." The woman looked at Gert and me. "It's safe to remove your helmets. Our normal atmosphere is very similar to yours, a little higher in oxygen, but nothing toxic."

Gert removed her helmet and said in a completely casual tone, "Have you been awake the whole time, uh . . . Ergin, is it?"

"Oh no, Gertrude. Only since you opened the outer hatch. As you could guess, even computers can get bored in a couple of centuries with nothing to do but hunt for prime numbers."

I was beginning to feel like odd man out. I punched the button on the man's box. The results were similar to the first time. The man stepped from the box, stretched, looked at us, blinked, and addressed the woman in a language that definitely never originated in this solar system.

She replied in the same language and he nodded, then turned to Gert and me and said, "Nice to be out. I'm Jerin."

For a moment he stared at my hand, and I realized that shaking hands is not a universal gesture, even on Terra. Before I could withdraw the hand he said, "Pleasure, believe me." grinned and shook the proffered hand. "And this is Lithe," (he pronounced it with a short i) and gave the woman a slight bow, "who I am sure forgot to introduce herself."

"I did." Lithe admitted with no embarrassment whatsoever.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"I'm . . . uh . . . Gertrude—more or less." Gert said.

"Gertrude is the independent bio-analog of the computer in their vehicle," the disembodied voice of Ergin explained.

"Oh! Wonderful!" Lithe exclaimed. "If you've developed that far you probably have the technology to repair this ship. Are you interstellar yet?"

"Uh . . . No, Ma'am." I admitted. "We're still using chemical rockets, for the most part. We've got a few fusion units for interplanetary work, and electromagnetic launchers for low-g stations, but they're really still in the developmental stage."

Jerin shrugged. "No problem. You'll get there. With computers like Gertrude, it's more a matter of looking at certain phenomena in the right way than developing any radical new physics."

I wasn't quite sure which way he meant that remark, and I resisted the temptation to ask. These people seemed nice enough, but I wasn't forgetting, even for a moment, that they were aliens—and from a *very* advanced culture.

Jerin diverted my line of thinking by suggesting, "Shall we roust our engineer?"

I wasn't sure I was ready for it. I stalled by asking, "How come you speak our language so well? I mean, you've been locked in those boxes for two hundred years."

Jerin chuckled. "Simple. Ergin began analyzing your language and updating his vocabularies from the moment you came aboard. Each of us has a . . . uh . . . an implant that allows us to communicate directly with the data banks. When we were released from stasis we began receiving your language variation immeditely."

"Oh." One of my more brilliant comments, but it was the best I could do at the time.

Jerin walked to the engineer's box. I gritted my teeth and tried to smile. Who am I to spoil someone else's party—even when the host's suggestions make me want to chew my way through the nearest bulkhead.

I'm not sure what I expected from the odd looking engineer, but whatever it was it was a far cry from the reality.

When the box opened, the woman spoke to the engineer in the same language she and the man had used a few moments earlier. The engineer simply blinked his eyes. He stepped from the box, twiddled the manipulative arms in an obscure manner, stretched those massive claws over his head, folded them back into grooves in his chest, grinned and stated in rolling baritone that would have been the envy of any actor, "Stasis is a pain in the ass! I'm starving. Shall we eat?"

Jerin rolled his eyes up in an almost human gesture (the behavior of the membranes that formed the cross-slit pupils limited the expression's human qualities). "This is . . . uh . . . call him Rihner; it means engineer in Standard; no one can pronounce his real name. Even he has trouble remembering the whole thing. Typical of most technical professionals, he does tend to be less than diplomatic."

I couldn't argue that last remark. I have a degree in engineering myself. (Not that I'd ever used it. Considering my tendency toward disaster, I figured finding another line of work might be

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

LICENSED TO DNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a wise move. If you'd seen what I managed to do to some of the labs at good old U of Sydney, purely by accident, you'd understand my decision.) Anyway, I knew what Jerin meant. I'm not Mister Diplomat myself, sometimes.

Rihner raised an eyebrow and sniffed (a disconcertingly human gesture and sound, considering their source). "Since my name is my history, and my family's, I most certainly do remember it. But I don't have to be a diplomat to work on engines. Besides, priorities are priorities. Talking uses energy, eating restores it." Having made this statement, Rihner stalked through the door in the direction of the galley.

"He has a point," Jerin admitted. "We can talk while we eat. Would you care to join us? Our food may be different from what you're used to, but I think you may enjoy it—and it won't poison you."

I suddenly realized it had been several hours since I had eaten. "I'm agreeable. If it doesn't attempt to eat me first, I'll try anything once."

Jerin grinned at me. "Rihner's might, but Lithe's and mine won't."

I must have looked a little unsure —make that a lot unsure; eating around an alien like the engineer with his meter long claws and unknown culinary tastes made little quivers of cowardice chase each other through the short hairs of my neck. Jerin reassured me by laughing and added, "Don't worry, when Rihner decides to prepare some of his gourmet delicacies, Lithe and I make him eat in his own quarters. I'm not much for dinners I have to chase down and fight before, and even while, I eat them."

I didn't comment. I was busy giving myself a crash course in xeno-diplomacy.

Gert and I used one of the cabins to clean up for dinner. A couple of hours, under stress, in a pressure suit does not make for sweet smells. When the door closed, Gert switched off the video on the comm and collapsed on the bunk in a fit of shivers.

I didn't know what was wrong but I figured I'd find out soon enough. I sat on the bunk beside her and put my arms around her. "Hey, calm down, Sweetheart. It'll come out OK. After all, when you've regained contact with the blade you'll be one person again."

Her hands came up and she pushed me away. "That's what's wrong! I have and I'm not." She went through another fit of the shivers and buried her face in my chest.

I didn't understand, and I said so.

"The barriers went down several minutes ago, and I established contact with the blade immediately." Gert paused and swallowed hard. "It was awful! She tried to take control of me!"

"She? Who's she?"

"The blade!" Gert wailed. "That damned computer in the blade."

Uh-oh. Suddenly it all clicked. The personalities had split. Or, maybe there was no personality in the blade anymore. No. There had to be, or it wouldn't have tried to reestablish the original oneness. "Can you tell me about it?" I soothed. I needed to confirm my suspicions.

"When the block disappeared, I reached out to link with the memories in the blade. Instead I found this other person, another me, and she tried to take

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

over my mind. It was like fingers pawing at my innermost self."

"And?"

"I fought. I'm not about to let anyone take over my mind."

"Maybe she felt the same way."

"I think—no, I'm *sure* she did."

"Why?" I was playing psychologist. I hoped I wasn't fouling up the whole situation.

"She backed off. She actually apologized and opened a comm link to the main data memories—but not to the personal ones."

"Can you talk to her?"

Gert thought that one over. "I think so. But I'm afraid to. She might try to take me over again."

I doubted that, but I wasn't about to push it. It could wait till we got back to the blade. I gave Gert a hug. "OK, let's leave it at that for now. When we get back to the blade, I'll mediate and we'll see what can be worked out."

Gert snuffled a while longer then agreed.

"Fine. Now, let's go eat. Suddenly I'm starving."

Gert looked a bit surprised. "You know," she said, "so am I."

Thank heaven for a female's instinctive pragmatism.

The meal was more than enjoyable. It included dishes from several worlds, even Terran coffee, for which I was grateful. Despite the unusual taste of some of the dishes, I found I liked ninety percent of it. The other ten percent I put in a class with liver: it may be edible to some people, but I'm not one of them.

There was one dish I found particularly tasty and said so. Rihner gave me a grin and said "It comes from my planet—but it's better fresh."

From the look Lithe gave him I decided not to ask for his definition of fresh. I had a feeling I might not be able to continue eating it if I did.

Where eating was concerned, the aliens did their fair share, and in a manner that kept me intrigued spotting differences. The second opposable digit and a slightly more flexible wrist enabled Jerin and Lithe to handle two utensils or hold a glass and . . . oh . . . say a fork in one hand without missing a move with the other. Fascinating. They'd be a terror at any boarding house table. They also seemed to have a greater ability than most humans to do different things simultaneously with different hands. Brain differences? Training? Damned if I know. But the result was something distinct and definably nonhuman.

Rihner didn't use anything but what nature endowed him with—nor did he need to. Liquids he sucked up through the tips of those big claws—unnerving to watch—worse when you thought about what that adaptation implied about their other functions. Stab and suck. Practical, but *ugh*. Solids he handled with whatever pincers were appropriate (in size, shape, or sharpness—and a couple appeared to be very sharp indeed) to the task involved.

Anyway, I tried to be polite about my observing, but the cultural and physical differences were too unique not to watch at all. The aliens seemed to take it in stride. If anything, they seemed amused by my interest. Considering their job, that's not surprising. They probably en-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

tertained . . . uh . . . less cosmopolitan guests fairly frequently.

During the meal we got to know each other better, and if initial impressions are worth toad squat, I really began to like these people. Three people who spend their time investigating unknown solar systems and figuring out how to deal with any intelligent cultures found, no matter how alien, have got to have a lot of chutzpah. They seemed so human in personality and emotional reaction, I had to keep reminding myself they were anything but. I had no doubt that those human reactions were the result of studying humans and being trained to react properly to any humaniform culture they encountered. The knowledge that they were experts in dealing with cultures different from their own kept me from anthropomorphizing too much.

After a dessert course I won't attempt to describe, beyond saying it was a perfect compliment to coffee, Jerin leaned back in his chair and looked around the table. "Serious time, folks." he said with no preamble. "Can you, or perhaps more to the point, will you help us?"

I looked at Gertrude. Her computer banks were a better judge of the situation than I was.

"It may not be that simple." she said. "Jim and I would help, if we could. But, we simply don't have the equipment on board to do so. I gather, from the data Ergin has been feeding to the blade while we ate, that the technology is available on Luna, but the question is how to make use of it without getting into a political situation you may not desire. I'm sure you realize this goes a long way beyond what we, or, for that matter, the company we work for, can deal with—or even make decisions about. The impact of an interstellar culture on our own civilization is not something to be taken lightly—as I'm sure you know."

"True—very true," Jerin remarked. "Having masses of people descend on us is the last thing we want or need—particularly when we can't run if necessary. Is there any way you can quietly contact someone in authority? Someone who can be trusted?"

"We have to face the fact," Lithe interjected, "that all governments, even our own, are politically motivated, and therefore, not to be trusted. Believe me, I have no desire to find myself helplessly incarcerated and interrogated while someone tears this ship apart to find out what makes it go."

If Ergin was anything like Gertrude, I severly doubted that anyone could even get entrance, let alone disassemble anything, if Ergin didn't want them to. Further, I knew that they could still run if they had to, perhaps not interstellar, but run nonetheless, then hole up again to wait for a more compatible culture to arise. I knew this, but it wouldn't have been diplomatic to say so. I was learning.

"I don't know," I said, "But we have reference material on the Blade that we don't have here. Would you mind if Gertrude and I returned to our vehicle and checked it? We should be able to give you an answer then." Part truth and part lie, but I needed to talk to Gert alone—and unmonitored. These aliens seemed to be nice people, but they had their interests to consider, and

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

we had ours. For that reason I didn't trust them worth toad squat.

"Not at all." Jerin said. "It's a sure bet we aren't going anywhere very soon."

I wondered who he meant by *we*, but I thought it wiser not to ask. "Thanks. We'll be back before long."

IV

It was a long tense walk back to the Blade.

When we were aboard and unsuited I broke out a bottle of La Phroig I'd been saving and poured a stiff double—neat. Gert shook her head no when I raised the bottle to her. "I need clear thinking, and bio-engineered or not, it does affect me."

That startled me. "But how could it have any effect on your main banks?"

"It can't," she said and gave me an odd smile. "But we're not the same any more—remember?"

"Yeah. Now that you mention it." I took a deep breath and plunged over the brink. "Which raises the question, what are we going to do about it?" I really hoped they would be able to find a way to reunify.

"Learn to live with it—and each other." This voice came from a speaker. It was Gertrude, all right, but not the same as the voice of the bio-analog Gertrude sitting on the arm of my chair.

The strain of dealing with both aliens and this situation made me a bit irritable. The strain showed in my response. I asked harshly, "How could you allow something like this to happen in the first place?"

The blade's voice answered with equal snappishness, "I didn't intend for it to happen this way. The ability to act independently was originally designed to be a safety precaution. We," Gert paused and corrected, "rather I, made the modifications so that my analog could function capably in an emergency, without having to depend on the blade's computer banks."

Gert—the blade's Gert—was quiet for a considerable time. There was strain and a touch of bitterness in her voice when she continued. "I never realized that the independence might be permanent. Although, I probably should have. Simply put, where there was one personality before—now there are two. And that is the way it is going to remain."

I felt tension drain from Gertrude-analog.

"But, but . . ." I stammered.

"Quit sounding like a two stroke generator, Dear." Gertrude-analog said. "It's not your problem. And no, we can't get back together as one person. Would you let your brother take over your mind?"

I didn't have a brother but I got the idea. As for it's not being my problem—toad squat. Now I had two temperamental and lovable females to deal with. Wonderful!

"You can still communicate, I assume?"

"Certaintly." both answered. A weird audio effect.

The blade's Gert went on, "We can work out a process of communication, and timesharing of the main memory banks, without threatening each other's personality.

I thought that over for a second then

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

asked, "So if I say Gertrude, whom do I get?"

"We're working on that." Gertrude-analog said.

"Well, work fast." I told them. "We have a few other problems to consider."

"OK!" Gertrude-analog bubbled and plopped into my lap. "Call my mother, and your ex-lady-in-waiting, Gertrude and call me Trudy."

"Uh—" I got out before Gert commented. "It sounds reasonable but, My Daughter, the Man Stealer, where did I go wrong? You have a lot to learn—daughter."

I knew Gertrude well enough to recognize strained calm when I heard it, no matter how well concealed by an attempt at humor. If Trudy's sudden independence bothered Gert so much, why did she agree so readily? I was afraid to think about that why, let alone ask. I knew Gert too well.

"Agreed," I said, deciding to change the subject. "Now, can we consider what in hell to do about our alien friends and *their* problem?"

Gertrude thought for a long time before speaking. "What they asked, about finding an independent judge, may be possible. The main computer at Luna City is also self aware—" (This was news to me, but I didn't say so.) "—and given the data may be able to identify and contact people in authority who can be trusted to make honest decisions in all our best interests."

I felt it was time I put my two credits in. "First of all, do we *want* to help them?" Trudy started to say something and I held up my hand to gain myself some thinking space. I didn't like what I had to propose, but . . . "Let me rephrase that. Yes, we want to help them—but it may not be possible. Even if we can trust them—and despite their assurances, I'm still not sure that we can if our interests develop any conflicts."

Gertrude interrupted, "Computers can't lie to each other without detection—we can trust them."

I nodded but I wasn't smiling. "Even so, unless we're ready to scrap this whole solar system we may have to find a way to destroy them instead."

"What?!" It was a chorus. There was more. The girls obviously didn't agree with me and expressed that disagreement vocally.

I let them run down before continuing. "Ladies, I'm not sure *what* we should do. But I do know that if the existence of that ship and the technology it carries ever got out it could lead to *Homo sapien*'s tearing himself to pieces trying to possess it." I paused and broached the subject that was really bothering me. "Either that or the domination and control of this solar system by an alien culture."

"Why?" Trudy asked. "A civilization that's as advanced as theirs can't be interested in conquering a bush league system like ours."

"They wouldn't be," I agreed. "But if the technology on that ship got out they might be forced to."

"So?" Trudy said. "At worst they'd simply put in an overseer system to keep us from chopping each other, or anyone else, to bits until we learned to be civilized."

I shook my head. "The thing that scares me about the idea of an overseer government, no matter how benevolent, is how humans would react to it. There

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

are a lot of possibilities, but given human history, the most likely is that they would resist, violently resist, any alien-imposed government.

"Look, there's an old biblical text that goes *Yea, though I walk through the valley of the shadow of death, I will fear no evil.*" Trudy nodded and I continued, "Well, centuries ago some wag added a line that gives mankind's psyche in a microdot. He appended, *Because I am the meanest son-of-a-bitch in the valley!*

"The human ape thrives on conflict. We fight because we like to fight. Just to prove to ourselves that we *are* the meanest S.O.B.'s in the valley."

Gertrude broke her silence with, "You mean man would fight the aliens just to prove he was tougher than they are?"

I nodded agreement. "Historically, we don't tolerate competition from outsiders worth a damn. Not even from members of our own species, let alone aliens."

Trudy still wasn't totally convinced. "If the aliens saw that happening, wouldn't they just pull out and leave us to our own devices, until we developed an acceptable civilization?"

"Maybe. But would they dare? How could they suppress the technology already revealed? Even if they succeeded, once humans knew interstellar travel was possible, they'd develop it—and the weaponry to make the overseers regret they'd ever heard of humans.

"That's not logical, humans couldn't win such a fight. They'd be forever playing catch-up. After all, to advance as far as they have, the aliens were probably the meanest S.O.B.'s in their valley too," Trudy said.

"You're probably right, but logic plays little part in the kind of hate reaction the presence of an overseer government could generate. If you want to make a man hate you—put him down. And that is just how humans would see an overseer government—as a gigantic, interstellar put-down."

I stopped and added as an afterthought, "And given man's talent for high tech and low cunning it might be more of a fight than you think."

I shook my head again. "No, if an overseer government was resisted in the way I think it would be, the only possible solution would be to kick *Homo sapiens* back to the stone age level."

"But," Gert asked, "if mankind could be brought up to Federation standards of civilization without knowing they were being guided—or that such a guiding galactic culture even existed?"

"That, in all probability, would work like a charm. Mankind would find out eventually but, fait accompli is easily forgiven when you've benefited from it. However, with that ship sitting over there, and the temptation of the technology it carries, the undiscovered and unknown is the hard part. Can we trust *anyone?*"

"Yes," Gert stated flatly. "We can trust the Central computer. If there is anyone on Luna with the authority and judgement to help that ship, and keep it under wraps, he'll find them. If he can't find anyone . . . Well, we'll just have to have a go at that one if we come to it."

We were about out of choices so I crossed my fingers, said a prayer that the great god Murphy was looking the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

other way, and said, "OK, girls; if you think the aliens can be trusted and that Central may have the answers—feed him the data—but if he comes up zeros—"

Gert gave me an unlikable reply. "I'd love to, but I can't."

"Uh . . . and why not?" I don't know why I bothered to ask; I knew the answer.

Gert told me anyway. "All transmissions are blocked. Not jammed—blocked. I've been trying to realign our remote dish up on the rim—unobtrusively, of course—and I can't even get it to twitch. Radar reflection off rocks in the pit floor and walls tell me everything is damped out about fifty meters away. Lord! I'd love to know how they do that trick."

"In other words," I filled in the conversational blanks, "our friends don't want us transmitting until they approve the text."

"Seems to be," Trudy put in cheerfully. "Doesn't leave us much choice as to what we do next, does it?"

"Not really." I said and started sealing up my suit. "But you don't have to be so damn happy about it," I added as I closed my helmet.

"Why not? It gives Mom and me another chance to look around that ship and talk to their computer."

"Unless they shut Gert out again," I remarked.

"If they try that, although I bet they won't, I'll see how they like having their ship rolled over on its back," Gert said.

She would, too, I thought. Gert is not a lady who likes to be cut out. That thought gave me an itch I couldn't scratch; I still couldn't figure out how the situation with Gert and Trudy was going to resolve itself. All I could do with that one was sweat it out—so I sweated.

V

We were honest (mostly) about our doubts and concerns, so it took a while to explain what we had in mind and why. To my surprise and Gert's pleasure the aliens agreed completely. "Overseer governments can't be used with high tech, carnivore descended species, and only rarely with omnivore descended ones," Jerin said. "You either have to leave them alone, bring them into the Federation as an equal, or eliminate them as an untenable danger." Jerin shuddered and continued, "We have seldom had to do the latter, but very seldom it has happened. I, for one, don't like seeing planetary systems sterilized, no matter how obnoxious their life forms. But at times it's the only option." Jerin looked as if he were trying to swallow something horribly bitter as he spoke, and my stomach was doing flip flops. I was glad to let the topic drop. More so, since there was no way I could know if Jerin's expressed distaste for such destruction was real, or applied alien psychology to candy coat a warning.

We also explained the new status of Trudy and Gertrude. This last seemed to intrigue (or bother) Ergin. When your only reference is a voice, and an alien one at that, it's hard to tell exactly *what* someone is thinking. At any rate, the questions he (she?) asked gave me that impression. But apparently he wanted to observe results of the split in operation, because he asked Rihner to bring

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

in a monitor unit which allowed Gert direct access to the discussion. I got the feeling it was only for appearances, though, and that Gert and Ergin were having a computer to computer tête-à-tête all on their own.

When the monitor had been installed Trudy continued, "I know you can block any transmission Gertrude makes—if you so desire. Ergo, we'll need your cooperation to do this."

Lithe smiled at her. "Nicely stated, Trudy. I think it's the best, no, probably the only course of action we have. You have my permission. Jerin? Rihner?"

Jerin nodded and Rihner shrugged, "I'm just the engineer—you're the diplomats. If you say it's a go, who am I to argue?"

Lithe stuck a bluish but otherwise very human looking tongue out at him. "Our everblooming pessimist agrees. Don't let him kid you. With certain societies, *he's* the primary diplomat and *we're* the supernumeraries."

Rihner just shrugged, but his very human eyes sparkled. His appearance might be alien, and I'll admit it still gave me shivers, but his sense of humor seemed human enough. I was beginning to like the strange looking engineer.

"OK, Gert, do it," I said, but with less conviction than I would have liked.

Trudy leaned back and closed her eyes. In a few moments she rejoined us and said, "Done. Central is analyzing all the data, but he's not encouraging. He says there are very few good possibilities. He'll choose the best and send them along or tell us if he feels there is no acceptable choice. Either way, he'll call us back as soon as he's completed his research. Now we wait. More coffee?"

Just like that, I thought. Damn! You'd think I'd be used to the speed of computers after working with Gert all these years—but I'm not. It still leaves me feeling a little fuddled and a lot slow—I've just had to learn to live with it.

Jerin and I looked at each other and shrugged. We were both thinking the same thing; I vocalized it. "How in the *hell can women wait with such equanimity* when the outcomes are so important?"

"Because centuries of being stuck on the second rung of the ladder taught us patience," Lithe replied dryly. "Something you males could do with more of."

Rihner chuckled. His race didn't have sexes in the same sense as Jerin's and mine. Watching the animals in the zoo amused him.

Jerin and I responded in the only sensible manner we could think of: we held out our cups for refills.

It took the better part of a half-hour, which gave me plenty of time to worry, before Gertrude said, "Central just contacted me. I think this should be relayed to a screen. Ergin, can you set it up?"

Uh oh, I thought. This is not good news. (Of course not. With my tendency to dump my toast jelly side down, why should I expect good news.) I was right—and wrong.

When the screen had been set up Ergin said, "Go ahead, Gertrude."

Gertrude's. "Relaying now" was followed by a male voice that sounded familiar, but I couldn't immediately place it. "Ladies, gentlemen, and En-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

gineer Rihner. I apologize for using audio only, but I have never felt the need to develop a physical self image in the human sense. A view of my master panel might be interesting, but hardly conducive to easy conversation."

Just what we need, I thought. A computer who begins his talk like an after dinner emcee. I wished he'd just give us the bad news and leave—and let me get on with the distasteful and perhaps impossible task of trying to figure a way to blow this ship and its occupants to hell-n-gone. Maybe it couldn't be done, but I was sure going to give it a helluva try.

Central's voice continued, "I have reviewed the data and, I am sorry to say, have reached the conclusion that there is no trustworthy human in position to aid you without placing himself in an untenable position. The Chairman of the Lunar Council, James Leeds, was my only possible choice."

Bingo! Now I recognized Central's voice. It reminded me of Leeds' uncle, James Hardt. Hardt was also a councilman. In fact he was the retired Council Chairman—known and respected by one and all as Uncle Jim. That Central thought enough of Uncle Jim to borrow his voice made me feel a bit better about whatever he had to say—even if it *was* bad news.

I put my daydreaming circuits on hold and started listening again. Central was saying, "I feel that since he would be unable to do the work himself, he would be forced to involve others who, no matter how good their intentions, might compromise the secrecy which you feel is necessary—justifiably, I might add."

"Great!" I muttered, "We're back to zip." I started planning how to get explosives aboard this ship and where to place them for max effect. I'd worry about triggering them later. I'm no hero, and the kind of heroism that earns posthumous awards is not something I like considering—But, if I had to . . . If it was going to be a choice between the aliens or genus *Homo* . . . well, there really wasn't any choice. I could smell the sweat beginning to flush out my arm pits. Nervous? Wallowing in pessimism? Who, me?

I got my attention realigned in a hurry when Central added, "However. Human assistance may be neither desirable or necessary."

Say what? I was hearing a reprieve and couldn't believe it. My mind bobbled around in its think box for a few seconds before it woke up. Of course! I got the answer just as Central concluded his effect pause. This computer might have the heart of a frustrated ham actor, but if he could finagle a way out of this mess, he was A-OK with me. I concentrated on what Central was saying.

"Inasmuch as I control most of the manufacturing and technical repair facilities, without human intervention, it should be possible to manufacture the required components without any additional human involvement. Is this acceptable?"

"Very." Jerin commented. "What would you require?"

"Basically, little more than the information Ergin can supply on the technology and design. However, having the original components for comparison and analysis would speed things up somewhat—possibly quite a bit."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"No problem," Jerin stated, "except getting them to you. I assume you have an idea how this could be done."

"That should be reasonably simple. As a scout ship, I presume you have some form of inconspicuous land transport. Two man, preferably."

"We do," Jerin agreed. "But, why two man?"

"I believe one of you, since you have worked with this technology before, could be of considerable assistance in testing the units. You have portable test equipment?"

"We do," Rihner said.

"Good. The second member of the party should be either Mr. Carter or Trudy. Someone who is familiar with Luna City must guide the crewman to the work area—probably Trudy as she can be quickly familiarized with the service areas where we will do the testing."

Mr. pessimism struck again. "Uh . . . How do we get in?" I asked. "Even the unmanned locks have recording devices and alarms. And, how do we pass off the crewman as human?"

"You can enter Luna City by one of the emergency service locks, whose alarms and monitors I control. I believe Gertrude carries extra pressure suits which would fit either Jerin or Lithe."

"I have extra suits," Gertrude interjected.

"I was sure you did. The suit's gloves will disguise the hands, and a pair of dark glasses the eyes. Exposure to humans will be minimal at any rate. Most of your route will lie through service tunnels used primarily by robots. I can divert any human techs from those areas for the required time. Additionally, since this may take some time, I will set up living quarters in the working area. Food can be supplied by any convenient auto-kitchen and delivered automatically."

"And if some tech accidentally wanders into the area?" I know I was overdoing the pessimism, but I had to ask.

"Techs, nor anyone else, do not accidentally wander into areas I control, James. Politics and business being what they are, I cannot risk it."

He didn't have to explain. I could think of a dozen or more Terran governments and businesses that would love to sabotage Luna's main computer.

Jerin stood and stretched. "Sounds like a good plan. Who goes?"

"Since you know more of the technical than *I* do and it's a sure bet Rihner won't fit into a human suit," Lithe said, "You're elected."

"Good. Let's get to it."

"Uh . . . What are Gert and I supposed to be doing while the new parts are being made?" I wanted to know.

Central answered, "Continuing the excavation, James. We most certainly do not want any investigations arising from an unexplained work stoppage."

"How about the supply flitter? It's due in two and a half weeks."

"We should be finished by then," Central said. "However, I might suggest you conceal the ship—if you haven't already."

We hadn't. But, I wasn't about to admit it.

"If I might make a suggestion," Ergin's voice broke in.

"Go ahead. Everyone else is," Rihner commented.

"Hmmph. From the data Gertrude

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

has given me, I believe I can design several simple modifications that will greatly increase her efficiency. Modifications that can be explained as innovative field improvements. Assuming, of course, that Rihner is agreeable to installing them."

Rihner shrugged. "Why not? It would be a lot more interesting than rereading two-hundred-year-old tech journals. I might even come up with a few improvements myself. You don't know all the tricks, Ergin."

"Do so by all means," Ergin's voice remarked. "I certainly wouldn't wish you to get bored by just following directions."

Rihner grinned and made a comment in what I guessed was his native language. The grunts, groans, whistles, hisses, and clicks sounded like centipedes tap-dancing on a tin roof while someone tried to tie a large angry snake in a knot. He added a complicated series of gestures, none of which I could possibly describe. Both comment and gestures were, I assume, insulting. In any case, they drew an electronic chuckle from Ergin.

I didn't know if the exchange had been preplanned humanity or completely natural to the aliens. Actually, at this point I figured it didn't much matter, so I shoved my instinctive suspicion and pessimism into a hole and let myself enjoy the exchange, chuckling with everyone else.

An hour later I was sitting in Gert's command chair, watching Trudy and Jerin disappear over the horizon riding a slick little sled whose motive mechanism and control were a mystery to me—but, I hoped, not to Trudy. She was driving. Rihner was below decks making working noises. When they were gone I made a pot of coffee and, cups in hand, went down to see what Rihner was doing. I might have to work on those mods someday, and I figured I'd better know what they did and how they went together.

VI

For the next two weeks I waited, carried on pessimistic dialogues with myself, moped, and grumbled at Gert. I was a perfect match for her. She was mysterious, cheerful, preoccupied, and grumpy in a random cycle. Whatever, it was a fast two weeks. Ergin's and Rihner's mods had worked miracles in Gert's capabilities, and not only were we on sched, we were well ahead of it when Gert announced that the sled was coming in.

Gert was so cheerful and pleasant when Trudy came through the lock that I wondered what-n-hell was going on. I had chalked her previous moodiness up to work and not being able to indulge in the human pastimes she had come to enjoy while having a bio-analog available. Now, I was beginning to wonder.

Trudy peeled out of her suit, gave me a kiss on the forehead, and flopped into the second seat.

"How'd it go?" I asked.

"Great! Central brewed up a set of gloves that looked just like human hands and a pair of contact lenses for Jerin so we could play tourist. He also finagled a credit line for us and we did the town—several times. We even attended a session of the Lunar Council. It gave Jerin a chance to see humans at their best—and worst."

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Worst?"

"The Council meeting was a bit on the ragged side." Trudy grinned.

And I thought she'd meant some of the drain level spigots. I might have guessed. I rolled my eyes toward the overhead. "Without getting caught, I trust."

"Not a chance. Not with the quality of the disguise Central rigged."

Maybe it rankled that I had been sitting, working, and worrying while Trudy and Jerin had been having fun. (I knew they'd been working too, but . . .) Anyway, my next question was a little sarcastic. "And just how did you explain *my* absence and Jerin's presence to our friends?"

Trudy ignored the sarcasm. "Easy. I didn't. Central rigged some changes for me too. Not radical, just enough to prevent me from being easily recognized." She shrugged. "And, we avoided places where you and I are really well known. Anyway, they're going to install the units. Want to come over and watch?"

Gertrude, her image on the console monitor wearing a wide grin, commented. "An excellent suggestion, daughter."

Now I knew for sure that something was up. "What in the name of little toads is going on?" I bellowed.

"Go over to the ship and find out. You might get a nice surprise." Gert said in a complacent tone that scared the behoosis out of me. "Help him suit up, daughter. The poor boy looks a mite befuddled."

That was putting it mildly, but I started suiting up. I figured that going over to the ship was the only way I was going to find out what was happening. Trudy did help—but she giggled a lot. That really made me nervous. For all I knew, we were all in for a sudden, and unscheduled, trip across half the galaxy.

Three people greeted me in the rec room: Jerin, Lithe, and Rihner.

"Ah, James," Central's voice commented. "Now we can proceed. Have a seat."

"Uh . . . yeah." I grabbed a chair. Trudy parked herself next to Jerin, a development which I wasn't real sure I cared for. When I got myself sat I asked in what I thought was a calm voice, "Now. Will someone please tell me what's going on?"

"Certainly, James, we are preparing the processes for integrating Homo the Sap into the Ionian federation. First of all, Trudy goes with our delightful alien friends as our representative—"

"Trudy does what?" I blurted.

"Goes with Jerin and company," Central stated complacently. "They seem to have developed a certain fondness for each other, and we *do* need a reliable representative to the Ionians. It would seem to me to be the ideal arrangement."

Trudy gave me a worried look and came over and sat on the arm of my chair. She took my hand in hers and squeezed it. "They made me an offer I couldn't refuse, Jim. New data banks, new worlds to investigate, a society in which I'm a fully accepted *person* . . ."

I started to say something. I don't remember what, but at that point it was probably something that would have caused me regret later.

Trudy didn't give me the chance. She

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

placed a finger gently on my lips and went on, "Besides, I'm too fond of both you and Mom to stay around. We're both possessive beasts, Mom and I. Sharing you would *not* have worked. The situation would have turned impossible very quickly. If you think about it, you'll realize I'm right."

She was, but that didn't make it any easier to accept emotionally. I fought down a ripping case of the passionate chartreuse jealousies and finally got out a truly brilliant "Oh." I gulped a couple of more times, suddenly recognized Gert's hand stirring this particular pot, and shut up. After all, it did stop me from worrying about what Gert had up her sleeve. On that point, Trudy had scratched a big itch. I had never for one moment believed Gert was casually going to allow Trudy to take over the . . . uh . . . biological duties *she* had been performing—not without a royal fight—which I would have been in the middle of.

I was glad and sad at the same time. Trudy had shown a streak of youthful overconfidence and bravado that made me distinctly uncomfortable. Her new duties as the Solar System's representative, and the association with a society in which sentient computers were fully accepted members, would train that out of her. At the same time, she'd be supplied with a new main unit that would be far more powerful than the one in the blade—and more portable to boot. But, it was going to be lonely—sort of—until I figured out a way for Gert to have another analog made; but I'd survive. Which thought made me think of another little problem—how Gert and I were going to explain the missing Trudy to Luna Construction. Ah well, I never expected *everything* to go smoothly—maybe Central could come up with something. Meanwhile . . .

When the congratulations were over, Central continued, "In the interim, you and Gertrude *and* I will prepare mankind (or at least do the ground work toward preparing them) to be an agreeable part of Galactic civilization."

It sounded simple, the way Central put it. That worried me. "I can see where you might be able to exert some influence, but where do Gert and I come in?"

"Basically, you trickle new ideas into the working man's consciousness. Mostly sociological, but with a few new and inventive technical ideas—like the modifications Ergin built into Gertrude. Gertrude can explain the details after we see our friends safely on their way."

A familiar voice behind me said, "James and I may have a few other details to go over first."

My head snapped around so fast my neck cracked audibly in protest. The woman in the door looked like Trudy—and didn't look like Trudy. She was older, more mature, better looking(?). My neck creaked a few more times as my head swiveled while my brain made comparisons. "Gert?" I finally said.

"In the flesh—again." She smiled, very possessively. "You really didn't think I'd let my own daughter ace me out of my favorite man? Or did you?"

"Uh . . . no." My worries about explaining Trudy's disappearance had been resolved—this solution was ideal— but where did she get the new . . . "Gert, where did you get the new body?"

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

"Oh, Lithe and Rihner had Ergin grow me a new one while Trudy and Jerin were in Luna City. We even included some improvements. They have quite a bio-lab on this boat. After all, with Ergin's analog they might need one."

I was back to imitating a nitwit again. "Oh." Ergin's analog? Who was Ergin's analog: Lithe, Rihner, Jerin? None of them seemed to fit—they all had such different personalities.

Jerin enjoyed my confusion for a while, then explained, "I am, James. That was why I was so interested in the results of the cutoff between Gertrude and Trudy. It hasn't happened to Ergin and me yet—our form of linkage makes it far less likely—but it could."

"Close your mouth, darling," Gertrude stage whispered in my ear. "There aren't any flies on this ship."

I closed my mouth and gave her a squeeze. It was nice having her to squeeze again.

Something bothered me. "But, if you're Ergin's analog, how come you have such distinct personalities?"

"Diplomacy is the how come why," Jerin explained. "There are some races, not terribly uncommon, actually, that don't mind computers that look like machines—and many of those races are even willing to accept the idea of sentient computers. But a sentient computer that looks, acts, and sounds like one of them? They'd have blue fits. A variation of the old 'I'll work with them, but I'll be damned if I want one in the family' syndrome."

I nodded agreement. I could visualize how most downsiders would react to Gert. Bio-analogs were still only barely acceptable on Luna—and very few people even suspected they were sentient. Most thought their abilities were simply the result of ultra advanced programming. In a way they were right.

"The how of the how come," Jerin continued, "is that, while Ergin and I are aware of only one *I*, we have different aspects of our personality stored in different locations—physically, either in myself or Ergin's main memory. It's rather comparable to the way your hand and foot operate—they're part of the same entity, but normally operate in totally different ways, and never mistake one for the other."

Logical, I thought.

Jerin gave Gert a wink and told her, "At the moment you may be a bit split shy but as you get used to your new linkage and its advantages, you'll probably develop a similar working arrangement."

Gert nodded and gave a noncommittal "Maybe."

Lithe broke into the conversation with, "Enough technical stuff. We're going to have to leave soon, and I hate sentimental farewells—so let's have a party."

We did. I won't bore you with the maudlin details—I got the impression that certain social . . . uh . . . customs are common to all sentient species—it's sufficient to say the party was fairly typical of such things. After Trudy and our friends had left, Gert, Central, and I spent a fair amount of time arranging the rough details of what we were going to do and how we were going to do it, then he signed off and Gert and I got on with the excavation.

Three weeks later, we were headed

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

back to Luna City. Everything was half-micron-smooth. The job had not only finished on schedule, but ahead. The modifications that Ergin had put into the blade were, under the terms of my employment, my own property. I could patent them and, if anyone else wanted to install them, make money off them. A lot of money, according to Central, who was going to arrange for an attorney to handle the legal aspects. So why did I feel so uneasy?

I was sitting in the command chair, staring at nothing in particular, and letting the cup of coffee in my hand get cold, when Gert draped her arms around my neck and asked, "What's bothering you, Sweetheart? You look positively morose. Didn't everything turn out A-OK? The Federation scouts have their ship repaired and are on their way home. Trudy's getting her big chance—and getting out of my hair—by going with them as Luna's representative, and mankind's too, for that matter. Central will keep the whole episode under wraps and release what new data we unavoidably acquired when, and if, it seems safe—and in a way to make it seem natural. We've cast a whole lot of new illumination on that darkling plain, Dear. We've got a bright future together. What's to worry?"

"Yeah . . . I know." I took her hand and gave her a forced smile. "I guess I just regret losing so much of that advanced technology. I'd love to have seen man build his first star ship and join the Federation. And think of all the advances in bio-engineering, in medical science—the stasis box alone would save hundreds of lives. Now it's gone back to the stars and all we can do is work, wait, and hope."

Gert hugged me and kissed me on the cheek. "Well, not exactly," she said.

"Huh?"

"Computers like to gossip too, James. And, they can tell whom to trust a lot better than their users. What their computer knew, Central and I know. And that's a lot."

"You're kidding!"

"Nope. Trudy and Central learned a great deal of galactic technology while making the replacement parts for the ship. I learned gobs, just in the fields of bio-physics and human medicine, when Ergin helped create the new me and make the final modifications to myself that our technology didn't allow me to do."

"Modifications? What modifications?" I was suddenly getting a very uneasy feeling. What, exactly did that new linkage involve? Telepathy? I didn't think I could handle that, at least, not quite yet. Women can read men quite well enough, thank you, without being telepathic.

"No, I'm not telepathic, exactly—except, maybe with my master banks," Gert said, reading my mind. "I'm not quite clear on how that works yet, and I seem to get some emotion bleedover from you, and others I'm near, if I know them well enough. But it's not really telepathy in the sense you mean."

Maybe not, I thought. But I was going to be a lot more careful about what I thought in the future.

Gert took time out from her explanation to give me a reassuring kiss. "Besides," she told me a while later, "I love you too much not to respect your privacy.

There was another pause while she applied more reassurance in a non-verbal and quite enjoyable manner; finally she said, "Getting back to the topic of changes, my personality is now totally

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

housed within this body. There is a dormant, but continually updated version in Central's memory banks in case something happened to me, but it is very dormant; so dormant it can only be awakened by a specific command from Central. I have no desire to go through the trauma of another split personality." She paused and thought for a second then concluded, "That's about all, a few other biological mods to make me more human, but nothing radical."

I was immediately suspicious. "What, exactly, does nothing radical consist of?" I asked.

"Well . . . unless you want a very pregnant computer on your hands, we are going to have to take steps."

All I could do was gulp—and kiss her. The illumination level on Darkling Plain had definitely increased, and it was due to get a lot brighter in the, hopefully, not too distant future. I really would like to see a bit more of whatever surprises the galaxy is hiding. Even at the risk of stubbed toes, busted thumbs, and worse. I'm not fool enough to believe that Murphy's Law stops at the boundaries of our solar system.

I held Gert softly and nuzzled her hair as my thoughts drifted a bit farther out onto that plain. Gert's main banks in a ship like that scout . . . yeahhh.

EPILOG

The Senior exec of Luna Construction Inc. swirled the cognac in its snifter as he listened to the report of his assistant. His face reflected the unease and puzzlement he felt.

"Dome 64533 is right on schedule, sir," the junior told him. "The foundation work was completed a day ahead of schedule, and the dome installation crew has already installed the polymer cover and has started the inflation process. In another two weeks we should be ready to tell our customer to start moving his equipment in."

The senior raised a hand to halt the report. "Wasn't that the project one we assigned Carter and . . . uh . . ."

"Gertrude, sir."

"What?"

"Carter calls his smart blade Gertrude."

The senior nodded. "Right. Thanks, Junior. Gertrude." The senior paused again, shook his head, then continued, "And you say everything has gone ahead with no problems?"

"Yes, sir. Should there have been?"

"Junior, that team has never completed a job without screwing something up. Albeit, always to our eventual profit." The senior paused to take a respectful sip of his cognac and organized his turbulent thoughts. The junior, skilled at reading his boss' moods, maintained a respectful silence.

"Now," the senior went on, "you're telling me that their latest job has gone through error-free? I don't believe it. What have they done that we don't know about? And where is it going to show up?"

"Perhaps nothing, sir."

"Huh. Explain, Junior."

"Well, sir. You yourself said this was a team where two wrongs invariably made a right. Perhaps it's a case of a bunch of small screw-ups cancelling out. Maybe it's to our best interest, this time, that everything went on schedule."

The senior took some time to mull over his junior's suggestion before replying, "Perhaps, Junior. Perhaps. But if that's the case, why do I have this gut feeling that somewhere, somehow, we've been royally had?" ■

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

1. same, yule; delay, knee = Samuel Delaney
2. john; vara, lee = John Varley
3. robber; hind, line = Robert Heinlein
4. fillip; hose, eh?; farmer = Philip Jose Farmer
5. frayed; pole = Fred Pohl
6. pool; and, ursine = Poul Anderson
7. thread; saber, hoggin' = Fred Saberhagen
8. day, vet; palmer = David Palmer
9. fonder; Macon, tire = Vonda McIntyre
10. thee, adore; stir, gin = Theodore Sturgeon
11. harry; harry, sin = Harry Harrison
12. leary; nivine = Larry Niven
13. marryin'; simmer; brad, li = Marion Zimmer Bradley
14. frank; her, burred = Frank Herbert
15. headgear; pang borne = Edgar Pangborn
16. sear, ill; corn, bluff = Cyril Kornbluth
17. H; beam; piper = H. Beam Piper
18. jack; vans = Jack Vance
19. jaw, ridge; (har har); martin = George R.R. Martin
20. all, furred; best, stir = Alfred Bester
21. barium; long year = Barry M. Longyear
22. frits; lie, (brrr!) = Fritz Leiber
23. arson; Scot; card = Orson Scott Card
24. ell; sprag; decamp = L. Sprague DeCamp
25. joe; hall, domain = Joe Haldeman
26. gardener; doze, war = Gardner Dozois
27. bob; silver, burg = Bob Silverberg
28. roger; cell, as, knee = Roger Zelazny
29. harl, in; eleison = Harlan Ellison
30. frank; herb hurt = Frank Herbert
31. gym; bane = Jim Baen
32. jaw; joe; smith = George O. Smith
33. deaning = Dean Ing
34. sum, tao; sue, char, hit, cool = Somtow Sucharitkul
35. Norman; spin, rad = Norman Spinrad
36. gorge, scissors = George Scithers
37. bob; shekel, (E) = Bob Sheckley
38. pryin; all dis = Brian Aldiss
39. bob; pshaw! = Bob Shaw
40. day, mon; night = Damon Knight
41. gene; wolf = Gene Wolfe
42. edh; fur men = Ed Ferman
43. ran, doll; garret = Randall Garrett
44. our, their; sea; clerk = Arthur C. Clarke
45. Jerry; poor Nell = Jerry Pournelle

(continued on page 190)

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

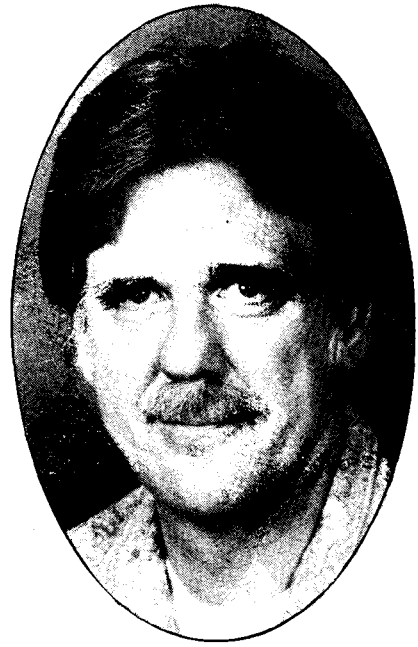
Jay Kay Klein's biolog

A "desert rat" who loves high adventure in the style of Hemingway, Peter M. Fergusson would have turned full-time writer years ago if only the word processor had been available. He was born in Glendale, CA, but a few years later went to live in Carp, Nevada, where his grandfather was stationmaster for the Union Pacific. In 8th grade he moved to Tuscon, where his spare time was spent on a ranch as a working cowboy. At 14, he helped drive 6800 head of cattle 400 miles up the Ajo Valley.

He fell in love with the desert and drove all over the Mojave from Las Vegas to the Mexican border. Gas money came from collecting botanicals for the LA County Arboretum and rattlesnakes for an antivenom lab, and from running a paper route. He also wandered, fished, and hunted in the Sierra Nevada, where he acted as a guide during college. He never did get a formal degree, studying botany, anthropology, art, literature, biochemistry, electronics, and computer programming spread over a number of colleges, but probably has enough credits in each for a complete major and a degree in botanical ecology.

He joined the Coast Guard as a radar technician and ended up in intelligence work. A radio amateur, he visited Nairobi to meet a fellow ham who was a professional hunter. They went after a 168-pound maneating leopard that turned out to be twins and acquired two trophies along with a variety of scars.

Pete tried writing science fiction in high school, getting the interest from acquaintance with Edgar Rice Burroughs who was a friend of his father. A. Merrit was on his paper route and gave advice. As a motor sports reporter for the Glendale News Press, he raced cars and drove in rallies, becoming an FCCA regional rally champion one year. Most recently, he was working in Indiana as a computer programmer, and discovered that word processing gave writing seven league boots. An assortment of published items, including a poem in *The New Yorker* and the June, 1984 *Analog*, were followed by three story sales to *Analog*. At the beginning of this year he



P. M. Fergusson

turned to writing full time. Safely behind are such jobs as QA engineer on Com Sat dishes, machinist, vacuum cleaner salesman, ceramics art teacher, rodeo rider (barebacks, saddle broncs, and bulls), smoke jumper, and jewel and art smuggler. He is now permanently retired from these early occupations. Writing is henceforth to be carried out in a newly built home on 35 acres at Joshua Tree, in the Mojave Desert just over the mountains to the northeast of Palm Springs. ■

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

the reference library

By Tom Easton

Artifact, Gregory Benford, TOR, $16.95, 544 pp.
Cuckoo's Egg, C. J. Cherryh, Phantasia Press, $17.00, 206 pp.
Skinner, Richard McEnroe, Bantam, $2.95, 208 pp.
Blood Music, Greg Bear, Arbor House, $14.95, ? pp.
A Coming of Age, Timothy Zahn, Bluejay, $14.95, 292 pp.
Trumps of Doom, Roger Zelazny, Arbor House, $14.95, ? pp.
The Fall of Winter, Jack C. Haldeman II, Baen Books, $2.95, 284 pp.
The Time Travelers: A Science Fiction Quartet, Robert Silverberg and Martin H. Greenberg, eds., Donald I. Fine, Inc., $16.95, ? pp.
The Hugo Winners, 1976–1979, Isaac Asimov, ed., Doubleday, $18.95, 561 pp.
Young Extraterrestrials, Isaac Asimov, Martin Greenberg, and Charles Waugh, eds., Harper & Row, $7.95, 240 pp.
The Year's Best Science Fiction, Second Annual Collection, Gardner Dozois, ed., Bluejay, $?, 574 pp.
The Future of Flight, Leik Myrabo and Dean Ing, Baen Books, $7.95, 283 pp.
Out of the Cradle: Exploring the Frontiers Beyond Earth, William K. Hartmann, Ron Miller, and Pamela Lee, Workman, $11.95, 190 pp.

Any writer will tell you there are moments when the creative powers flag. For some, those moments stretch on for weeks or months or even years of "writer's block." For others, they last only a few hours or days, and they tend to come at the ends of major projects. Happily, I belong to the latter group.

I tell you this because it is a struggle, this afternoon, to sit down to my typewriter. I've just finished my work on a book on entrepreneurs; now it's my co-author's turn (the book should be out about the time you read this, from Probus in Chicago). My momentum is exhausted, if only for awhile. Other projects await, including a new biology text for

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Harper & Row; the very handsome contract gives me money to buy a computer, at last.

Clearly, I can't *afford* writer's block! Fortunately, I don't expect to find it a problem, any more than do the prolific, productive stars of SF whose books adorn this month's column. Gregory Benford, C. J. Cherryh, Richard McEnroe, Greg Bear, Timothy Zahn, Roger Zelazny—if their powers flag, they apparently do so only briefly, and they keep turning out delights for all their fans.

Let's start with the Benford, **Artifact**. Its world is not much different from our own, except that Greece is turning socialist. This matters because the story centers on an archeological dig in that land, where Claire Anderson is excavating an ancient tomb while her boss fondles paperwork back in the States and the Greek codirector of the project, Kontos, tries to fondle her in his interludes from nationalistic power-seeking. Kontos is also in a rush to close down the dig, get the villainous, exploitative Americans out of the country, and claim all credit for the dig's revelations for himself.

Claire is already packing when her assistant removes a panel in the tomb's back wall to discover a black limestone cube from one face of which juts an amber horn. She promptly flies home to recruit a metallurgist who can analyze the mysterious object and winds up with the mathematician and physicist John Bishop. As the two fall in love, John discovers the artifact is radioactive, Kontos expels them both, they return to find Kontos has hidden the object, presumably intending to "discover" it himself later on, and they steal it.

Back in Boston, they soon learn that the cube seems to contain a naked singularity, or something very like. Kontos shows up to swipe the thing again and, when he jars the cube, the singularity gets out. Kontos's getaway boat sinks, the National Security Agency steps in, and the fight is on to recapture a threat that just may be what the minotaur legend is all about.

Artifact has it all—romance, suspense, action, intriguing physics (explained in an afterword). The story's logic is as inevitable as that of a good detective story, the characters live, and the pacing is relentless. Everything works, and works very well indeed. I recommend it highly.

C. J. Cherryh's **Cuckoo's Egg** will appear from DAW in due course. What you can find now is the first edition, from Phantasia Press (5536 Crispin Way, W. Bloomfield, MI 48033), and it's worth looking for. Cherryh gives us here a finely imagined first contact whose like I cannot recall. She introduces us to the shonunin, a species of vaguely Japanese cats (does she, here and with Chanur, demonstrate excessive feliphilia?). She offers us a novel way to reconcile social disputes. And it all works very nicely, as I will now show you (SPOILER WARNING!):

The first contact comes when a human ship plunges into an alien solar system whose felinoid inhabitants are at roughly our present stage of technological development. The locals attack the ship and with great effort destroy its crew. They thus gain the models for a quantum leap in their technology, but they also gain a racial anxiety attack. They are sure they have made a mighty enemy. Retribution could come at any moment, and they have no way to speak to their foes.

The answer resides with the shonunin's guild of hatani, whose members serve something of the functions of war-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

rior and judge. Any member of the shonunin species can appeal to a hatani for a solution to a dispute, but they must then accept whatever solution the hatani dispenses. Call the hatani professional Solomons, bear in mind that maybe the best solution is in fact to cut the baby in two, and you have the picture. You won't be surprised to learn that when the government turned to Dana Dunn Shtoni no Lughn for an answer, he chose to have one of the dead humans cloned and then walked off with the baby to raise it by himself. Dunn's goal was to produce a human who understands the shonunin and can serve, at maturity, as an effective intermediary. He teaches Haras, or Thorn, the human language with the aid of tapes removed from the captured ship, and the result appears very much as he wished.

We learn this much only as Thorn himself learns it. Cherryh reveals her story in a very different sequence, beginning with the infant Thorn in Duun's arms and progressing from there. That sequence alone could have been an entirely worthwhile story, but Cherryh gains an added level of conflict by exploiting the necessity of acceptance of a hatani's solutions. There are factions in her alien society, and Duun's final moves actually spark a nuclear war. Fortunately, the war is not total. The species survives, and Thorn stands as the hope of the future.

I do keep raving about Cherryh, and this time is no exception. *Cuckoo's Egg* is excellent, and execution is only part of the reason. Cherryh is consistently *original*. Her visions are seldom stale remakes of old classics. At her best, she strikes me as doing more to shape the future of SF than any other writer now living. She, almost alone, is inventing new kinds of stories, and I find her a grand relief from the endless swamp of mindless adventures and quests.

Richard McEnroe is a perfectly competent writer of perfectly good stories, and he's getting better, but—like many others—he does lack Cherryh's talent for originality. **Skinner** is a pleasure to read, it's good fun, it hangs together well, and it's not mindless. But I would probably praise it more if it weren't sitting right next to *Cuckoo's Egg* on my desk. The trouble is that it's "just" an adventure.

The tale is part of McEnroe's future history in which the stars are linked by ships that can tow in-system ships within their energy fields. There is a diffusion of technology from Earth outward, so that each local economy is constantly threatened by new arrivals. There is also a diffusion of people, with the first-comers occupying positions of power. And both diffusions affect the tale of *Skinner*, whose hero, Chavez Blackstone, is a newcomer to Hansen's Landing. When he offends a local kingpin, he winds up in the labor pool and is sold to the owner of the neighboring world of Trollshulm as a hunter and skinner of dragonlike lizards. His friend, Moses Callahan (remember *The Shattered Stars*?), cannot help, and Chavez must survive a brutal environment on his own. While he is doing so, a starship arrives with new technologies to disrupt the local economy. The ensuing intrigues lead directly to Chavez's escape and provide the conflicts that drive the tale.

Skinner is better thought out than McEnroe's earlier books, more thoughtful, better integrated. Its world is more alive, its characters more vital, its interstellar economy more thoroughly imagined. I do recommend it, and I suggest that as you read it you ask yourself

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

whether the author may not perhaps owe something to Cherryh's previous imaginings.

Still another worth recommending is Greg Bear's **Blood Music**, the expanded version of the *Analog* novelette that won both the Nebula and Hugo awards. Misfit genius Vergil Ulam finds a way to make cells, human and otherwise, read information into and out of their DNA, using introns (segments of genes that at the moment seem to serve no purpose) for storage. He develops versions of his own white blood cells that actually seem to display intelligence. The trouble is that he is doing this on the side, and when his bosses at Genetron discover what he's been up to, they order him to destroy his cultures. (Their real objection is that Ulam has come too close to a top-secret military project in another wing of the lab.)

But those cultures are his babies. He cannot murder them. Nor can he discard his dreams of success and wealth. He therefore sneaks his cells out of the lab by injecting them into his own body.

That is an astonishingly dumb move. Ulam's intelligent cells promptly begin to remodel their host, and when he tries to warn others, they begin to talk to him. They do not stop the warning, but they do delay it. By the time Nobel laureate Michael Bernard catches on, it is too late. Ulam's cells are already spreading, via handshakes and kisses, and the earliest victims are dissolving into the plumbing.

Bernard flees to Germany, where he puts himself into total isolation for study. At the same time, Ulam's cells are taking over every living thing in North America, constructing a single living entity of colossal intelligence and unknown purpose. All the rest of the world knows is that it can stop nuclear missiles from exploding, perhaps because observation by intelligence somehow shapes reality.

We witness the transformation largely through the eyes of the very few untouched Americans. Our minds boggle at the vision of immortality and transcendence Bear summons for us. We weep for the loss of the world we know. We rejoice in the end of childhood, not for a single species, but for a world of life. We marvel at the author who can extend a story so effectively that he —wanta bet?—picks up a *second* pair of awards. He is, in his own way, as original as Cherryh.

Timothy Zahn is another productive writer, and if anyone was worrying that *Blackcollar* and *Cobra* meant he was falling into a superwarrior rut, here is the proof of his versatility. **A Coming of Age** tells the story of Tigris some centuries after its colonization. Its people have survived the Lost Generation years, when a virus in their genes emerged with terrifying effect. Kids have telekinetic powers from age five until puberty; they thus have more power than adults, and for a time they ruled Tigris. Civilization faltered. Institutions crumbled. Records were lost. But the culture adapted. At the time of the story, at age five children are taken from their parents to be raised in hives, under the direct control of older kids who are in turn supervised by adults. They are kept ignorant of reading and other intellectual skills to keep them relatively pliant, and they are exploited as energy sources for industry. At puberty, when they lose their powers, they enter school and join the adult world. Puberty is thus a far more agonizing transition than we now know.

A Coming of Age portrays this situation deftly and unobtrusively. The

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

story centers on four people. First is the preteen girl Lisa Duncan who, slow to enter puberty, seeks to compensate for her incipient loss of status by learning to read ahead of schedule. Second is the scientist Matthew Jarvis, who kidnaps his own son to test a drug treatment that may let the boy keep his powers past puberty. Third is the fagin Yerik Martel who, in the guise of religion, taps child labor for nefarious ends. Fourth is the police detective Stanford Tirrell who, with his "Righthand," preteen Tonio, must catch a kidnapper. His investigation identifies Jarvis as the villain, but it does not tell where he is. As Tirrell searches, he learns what Jarvis is up to, and Martel's spies bring him a dream of power. When Lisa's own troubles bring her to Martel's camp, he hurls her against Tirrell, and all the threads come together.

If the book's ending is less than satisfying, that seems to be because Zahn has a high regard for realism. He has given his culture a bizarre problem, but he has also found a realistic adaptation, very much in the spirit of the SF "What if?" game. His story emerges from the problems that flow from the adaptation, and he again deals with them realistically, adaptively. There are no violent solutions, no thud and blunder, no high heroics. Tirrell nabs the villains, but then it is time for compromise and conciliation.

I found *A Coming of Age* a warm and sympathetic story very suitable for a broad range of ages. Lisa's presence and the focus on the crises of puberty make it seem aimed at adolescents. It will suit them admirably. But the tale is complex enough, adult enough, to appeal to older readers as well. Enjoy.

Roger Zelazny is prolific, productive, and fun to read. But he castrates his own creativity when he apes himself. **Trumps of Doom** begins another round of Amber novels, starring Corwin's son Merlin, while Corwin himself is as lost as once was his own dad. The plot begins moving under the force of repeated, yearly attempts to assassinate Merlin. With the villain revealed as a cousin, Zelazny needs a more frustrating nemesis. He finds it in Merlin's own creation, the Ghost Wheel, a cosmic computer that can riffle through the pages of the cosmos. When Random, the new head of the family, learns of it, he orders it shut down. Merlin hastens to obey, but the Wheel has turned sapient, and it will not let Merlin near. It will protect itself with all its enormous power.

What next? Who knows? Zelazny stops *Trumps* on a very frustrating note, just as he did the individual volumes of the earlier series. It's the classic cliffhanger trick that never fails to bring the audience back. We can be sure only of eventual victory. The details of family intrigue and villainy, of internal and external opposition, are the unknowns that keep readers turning pages and buying new books.

Jack C. Haldeman II gives us **The Fall of Winter**, and I wish he hadn't. The characters are dead, the prose lifeless, and the story itself predictable. Winter is a world whose toxic air and violent weather are all that keep it from becoming a valuable base. Accordingly, the terraformers step in, crashing comets and genengineering plants, animals, and people to modify and use the planet. But Winter is willful; it actively resists change, or so it seems. The terraformers call in trouble-shooter Roger Trent to help.

However, not everyone wants Roger to succeed. There are factions, and one of them wants the project to fail so that

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

it can gain control of the planet. Its tactics are sabotage and murder. Fortunately for Winter, Roger survives the crash of his floater and sees how the planet's life adapts to constant stresses. He returns to base with the key to human adaptation to the planet.

I won't tell you what that key is. Suffice it to say that to a biologist it rings loudly of nonsense. So does the book. Avoid it—but don't let that sour you on Baen Books in general. The list has many gems (see past columns), and I gather that Baen's biggest problem is availability. I hear from too many readers that the books are hard to find. Hence, I offer you the publisher's address: Baen Books, 230 5th Avenue, Suite 3-S, New York, NY 10001.

Robert Silverberg has recently shifted his advisor/editorial function from Arbor House to Donald I. Fine, Inc. The first result I have seen is **The Time Travelers: A Science Fiction Quartet**, edited by Silverberg and Martin H. Greenberg. The book is four classic, seminal time travel novelettes: Asimov's "The Ugly Little Boy" (1958), concerning a Neanderthal child snatched into the present and his relationship with his governess; Murray Leinster's "Sidewise in Time" (1934), the apparent first of the parallel-worlds tales, rarely reprinted because of its length; John Wyndham's "Consider Her Ways" (1961), of a woman who, thanks to a novel drug, finds herself in a world without men; and Henry Kuttner's and C. L. Moore's "Vintage Season" (1946), which shows us how even time travelers will flock to the scenes of disasters. An excellent selection.

It has been a few years, he says himself, but here, finally, is Volume 4 of Isaac Asimov's **The Hugo Winners**, covering the 1976–1979 years. Punctuated by Asimov's inimitable introductions, it gives us thirteen of the best. You will find Zelazny, Niven, Leiber, Spider and Jeanne Robinson, Tiptree, Asimov, Haldeman, Vinge, Ellison, Varley, Anderson, and Cherryh, seven from *Analog*'s own hallowed pages. I need say no more.

And here's one more in the long series of Asimov-Greenberg-Waugh anthologies: **Young Extraterrestrials**. The book seems intended to get the young folks hooked on our stuff by giving them characters they can identify with, and that's an aim I applaud. The stories all involve young aliens, so that the book resonates fairly strongly with a recent popular movie, and that makes me shudder.

Perhaps it's the overdose effect. We have here eleven tales, from James Gunn's "Kindergarten" and Piers Anthony's "In the Jaws of Danger" to R. A. Lafferty's "Primary Education of the Camiroi," with more by Zenna Henderson, Keith Laumer, Lloyd Biggle, Jr., Murray Leinster, et al. Most are fine introductions to SF. A very few belie their origins in the fifties and sixties by embarassing the modern reader, but the young adults to whom the book is directed will surely love even those. Remember how low our own tastes were, once upon a time? (Have they really changed?)

And now it's egg-on-face time. Martin Greenberg just called to say how upset he was with some of my comments in last May's column. I was trying to give you some idea of how he and his collaborators work together when they put together their anthologies, but my own idea of how they work was misinformed. Isaac Asimov originates some anthology ideas, he reads

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

and approves every story, in addition to writing introductions and—often—head notes, and the collaboration is actively tripartite from the very start. I apologize most abjectly for giving any other impression. Mea culpa.

Last year, I wrote a very complimentary review of Gardner Dozois's first collection of the year's best SF for Bluejay. However, the review never appeared; space problems meant something had to go, and that was the one.

Happily, I can now repeat myself. **The Year's Best Science Fiction, Second Annual Collection**, edited by Gardner Dozois, is now available. It is a gem for the bookshelf, it bids fair to be the best of the Bests, and it's not one to miss. Take heed: the greatest drawback is that it contains nothing from *Analog*, though eight of the 26 stories do come from *Asimov*'s.

Let me name what I think are the five best in the book: Octavia Butler's "Bloodchild"; John Varley's "Press Enter■"; Nancy Kress's "Trinity"; Lewis Shiner's "Twilight Time"; and Kim Stanley Robinson's "The Lucky Strike." The rest are by Lucius Shepard (2), Jack McDevitt, Connie Willis, Richard Cowper, Robert Silverberg, William Gibson, Gene Wolfe (2), Molly Gloss, Michael Swanwick, Jack Dann, Elizabeth Lynn, Rena Yount, Fred Pohl, Pat Cadigan, Bruce Sterling, Ursula K. Le Guin, James Kelly and John Kessel, Tanith Lee, and R. A. Lafferty. (I found the Le Guin, "The Trouble with the Cotton People," the least of the batch.) Dozois's "Summation" ably wraps up the year and his five pages of "Honorable Mentions" minimize a great many hurt feelings.

If last year's pattern holds, the Carr and DAW Bests will overlap this one surprisingly little. However, Dozois has given us a superb overview of 1984's SF, and I do not hesitate to recommend it as the one to get when you're having only one.

Leik Myrabo is a professor of mechanical engineering at Rensselaer Polytech. Together with Dean Ing, he has penned **The Future of Flight** as a determinedly, marvelously optimistic vision of coming days. Myrabo and Ing give us the ultralights very briefly and then turn to personal jets, hypersonic blimps, novel shuttles, and roving battlecraft. The key in most cases is laser propulsion, the area of Myrabo's specialization.

They are clearly right that ground-based or orbiting high-power lasers have great potential. Given the right optics, thrust chambers, and reaction masses, they promise wonderously responsive, economical vehicles, including some that resemble the classic flying saucer. The trouble is that the authors necessarily resort to a lot of arm-waving. Where will we get the power supplies? Don't worry about it; we'll solve that one when we come to it. Materials? Traffic laws? Details! Details! They ignore or dismiss so many real-world obstacles to their dreams that it is difficult to have faith in them.

But the potential *is* there. Read it and drool.

Astronomer William K. Hartmann and artist Ron Miller (*The Grand Tour*) with artist Pamela Lee have prepared **Out of the Cradle: Exploring the Frontiers Beyond Earth**. It's a sweeping survey of past, present, and possible future space missions, technologies, environments, and even lifestyles. The book is too broad to allow much depth, but that does suit its purpose, to inoculate a generation of youngsters with the

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

dream of space. It addresses that purpose with glossy text, dramatic four-color paintings, and an insistent optimism, and it may well succeed. It seems unfortunate that the dream must still be sold, but the US government still seems shy of the necessary large budgetary commitments and the public seems to have turned its attention elsewhere. I think of the two distinguished biologists who, in reviewing elementary textbooks, panned one partly because it urged a space-based future, "replete with imaginative illustrations." Too many scientists and policy-makers are putting their energies behind the short-sighted "equilibrium" future, ground-bound and ecologically sound.

My main objection to Hartmann et al. lies in a certain ingenuousness. One painting portrays a mother and infant in free fall very warmly, but it does ignore certain facts of life: a baby in free fall really should be diapered at all times! ■

ON GAMING

(continued from page 115)

If you find an object, even a common one such as a flower pot, look it up in *The Guide*. (The information in *The Guide* is contained on the game disk, and it's strongly recommended that you use it.) Megadodo Publications, which publishes *The Hitchhiker's Guide to the Galaxy*, know things that you don't, such as what a common object can be used for in an uncommon situation.

Of course, you have to learn some things by trial and error, such as how to get a Babel fish into your ear so you will be able to understand all the alien creatures you encounter when they speak to you. Getting a fish into your ear doesn't seem like such a difficult thing to do, but it can be a maddening experience in the play of the game.

Once you get the fish into your ear, you'll wonder if the effort was worth it, since you will be subjected to a Vogon poetry reading, an auditory experience best compared to listening to fingernails squeak across a blackboard while a Sex Pistols album plays in the background.

As with other Infocom games, *The Hitchhiker's Guide to the Galaxy* is a text adventure (no pictures or arcade-style graphics). This type of computer game is also described as "interactive fiction." As the story unfolds, you must make decisions and type in your actions and questions based on clues hidden in the text. You must read the text carefully and analyze it in order to play the game—wild guessing or inappropriate actions will be ignored or suitably punished.

Within the computer game, the humor is as much a part of play as it was in reading Adams's books. If you enjoyed the *Hitchhiker* books, you'll enjoy playing this misadventure, with yourself in the role of the mystified Arthur Dent. Even if you haven't read *The Hitchhiker's Guide to the Galaxy* or the other books in the series, you can still play and enjoy the computer game by Infocom. Any activity that combines laughter and intellectual challenge is worth a serious look from anyone who enjoys games or humorous science fiction. Highly recommended. ■

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

brass tacks

Dear Sirs,

I believe that Mr. Terra is guilty of exaggeration in his article "Hot Rocks and Water." He states that the biological communities surrounding deep sea thermal vents are "totally independent of the photosynthetic ecology." This cannot be true, given his description of the geological and bacterial processes occurring in these vents. None of the reactions described has molecular oxygen as a product, yet the multicelled organisms living around these vents all use oxygen in their metabolisms. Their oxygen must have the same source as that for all sea floor life: the great, seasonal downwellings of ice-cold, oxygen-rich water in the Arctic and Antarctic oceans. This oxygen, of course, is produced by photosynthesis.

This calls into question the possibility of complex life forms on a world like Europa. Many biologists believe that the higher energy levels available to aerobic cells are necessary to "fuel" multicelled organisms. Without photosynthesis, life on Europa may be limited to bacterial mats growing in the sulfurous effluence of undersea volcanoes.

WILLIAM J. LETENDRE

Brighton, MA

The Author Replies . . .

Mr. Letendre's objections are quite valid. The only members of the deep-sea hydrothermal vent communities described in my article that are truly independent of surface photosynthesis are the single-celled chemosynthetic anaerobes. The more advanced multicellular forms require free oxygen in order to carry out respiration. I do not feel, however, that his objections invalidate the general thrust of my conclusion that we may discover some "rather simple" ecosystems near similar hydrothermal vents on Europa. The question is *how*

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

simple. Such communities may indeed be limited to single-celled organisms.

The apparent link between multicellular organization and the availability of free oxygen does pose some serious obstacles for the existence of any complex organisms on Europa. Utilizing oxygen to metabolize carbohydrates yields on the order of ten times the energy produced via fermentation, glycolosis, and other anaerobic mechanisms. One could argue that alternative metabolic pathways might evolve in an anoxic (oxygen-free) environment, but this seems unlikely. Despite all the myriad photosynthetic, chemosynthetic, and respiratory pathways employed by anaerobic life forms on Earth, no multicellular anaerobes have ever arisen here. Still, terrestrial biology has been shaped by a number of factors unique to this planet, including the course of its geochemical and biological evolution; life arising elsewhere under different conditions may surprise us.

One other point to keep in mind, which may provide a dim ray of hope to our hypothetical Europans, is that the genesis of free oxygen during photosynthesis is not directly linked to the absorption of light energy, although sunlight is the ultimate source of the energy that plants use to split water into hydrogen and oxygen. If other non-photosynthetic energy producing mechanisms could be harnessed to drive this sort of "dark" reaction, free oxygen might still be released into the oceans of Europa. On Earth, the easy availability of sunlight made the evolution of such a system unnecessary, but conditions on Europa are rather different.

Of course, we won't really know for sure until we start drilling through the ice on Europa.

RICHARD PATRIK TERRA

Dear Editor,

G. Harry Stine's article on cloning does little to dispel my doubts about the ethics of cloning people for spare organ production. I cannot see the justification for the assumption that you can "own" a clone simply because you caused it to come into existence. If one does not accept that parents can do as they wish with a child simply because they used their own genetic material to create it, then I think one should concede all the rights a child has to a clone, including the responsibility of the parent/donor to protect it until it can lead an independent existence.

Do we want to live in a world where it is OK for humans conceived in the traditional way to be prevented from ever becoming self-aware, in order to have their bodies raided for spare organs? And if this is not acceptable, why should clones be any different, just because they were brought about by non-traditional means?

Before much longer, people will have to settle on what constitutes a "person" and what doesn't. For instance, what if a way is found to combine genetic material of humans and chimps? Myself, I would give the resulting being the benefit of the doubt, rather than run the risk of treating an intelligent being as a dumb animal with few rights. The human brain seems to be the most important element of "personhood"; so why not clone every organ *except* the brain? As long as there is not good evidence of "personhood" depending on other organs, there would not then be the implications of slavery, of owning someone, that occur if you clone an *entire* person.

DAVID CAMERON

Australia

Dear Readers,

Hello, friends. Stanley Schmidt ig-

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

nores this fact (Acid Raindrops, Feb. '85), but it's a dangerous world out there, full of perils. My organization, Take Exception to the Constitution, Inc., has a cheap plan to make things safer. First, we start by raising the drinking age in all States to prevent 18–21 year olds from drinking, thereby making the roads safer. We think this is important, and here's why:

1. Their age group has an inordinate number of DWI incidences.

2. Their age group causes an inordinate number of drunk driving related fatalities.

3. Preventing this age group from drinking will lower the incidences of DWI and drunk driving related fatalities.

This seems like a noble idea, doesn't it? Now, for our second proposal, let's extend the logic a bit:

1. Black males between the ages of 18–24 years old commit an inordinate number of robberies.

2. Black males between the ages of 18–24 years old commit an inordinate number of murders.

3. Preventing this age/sex/race group from going out in the streets (unless carrying passports stating their business) would lower the incidences of robbery and murder.

If the argument for the first case is held up constitutionally, then the second argument should hold up as well. Fair, isn't it?

Of course it is! And if you want to get involved working toward these goals, join my organization, Take Exception to the Constitution, Inc. Membership fees include an annual $20 in dues, along with your current civil liberties.

GREG ROSENTHAL

Dear Dr. Schmidt:

Your February editorial presented a peculiarly American viewpoint: that any exceptions to personal freedom (your "fine line") are a threat to all personal freedom. My understanding of world history is that one thing has little to do with the other.

The measure of a country's freedom is the extent to which the spirit of freedom exists. The Soviet Gulag is full of people brave enough—or naive enough—to have demanded the rights guaranteed them under the Soviet constitution. All the written rights in the world are irrelevant under a repressive regime.

A recent criminal case in Canada could not have been prosecuted in the U.S. A West German citizen residing in Toronto—a man described by West German authorities as one of the world's largest distributors of neo-Nazi and related literature—was convicted of violating a law barring the publication of false information that would likely cause unrest or intolerance. The spirit of American law being that a "fine line" here would endanger freedom of speech everywhere, this man would still be in business in the U.S.A.

The section of Canada's Criminal Code under which this prosecution was carried out can scarcely be held to have been abused, as this was only the fourth prosecution and second conviction in nearly a century. Is Canada less free today because a neo-Nazi is facing prison and possible deportation? Is the United States more free because he would have been guaranteed the absolute right of free speech? You can say that "fine lines" are dangerous—but without fine lines, when do you end up at the point of "reductio ad absurdum"? The Common Law approach (the proverbial "reasonable man") allows a reasonable exception to be made—an exception made difficult by the American "all or nothing" attitude.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

It was, after all, an American jurist known in his time as a civil libertarian who is supposed to have pointed out that the right of free speech is not extended to the man who would shout "Fire!" in a crowded theatre.

JOSEPH ASPLER

Montreal, Canada

The attitude expressed in the editorial was not *"all or nothing." The point (I repeat) was that justifying one "reasonable exception" makes it easier to justify another; and when they start proliferating, there is reason to fear for "the spirit of freedom" itself.*

Dear Mr. Schmidt,

Although I appreciated the body of the March 1985 issue of *Analog*, I was confused by the content of the Brass Tacks department. That being the nice way to put it.

No doubt there was significant value in your editorial about inheritance. I don't believe I've read it, so I don't know. But even assuming its quality, I wonder if *Analog* is the place for it.

There are any number of business and news magazines in this country. If I want to read about business, I read one of them. If, on the other hand, I want to read science fiction and letters and articles about same, I read a magazine like *Analog*. I am an escapist when reading SF, and I'm not ashamed of that. There is, after all, so much to escape from these days. So, outside of questions of quality, or validity of its message, I question this Editorial, and associated letters, as part of *Analog*.

Please to do your readers the favor of remembering that *Analog* is an SF/SF magazine. Try to edit it as such.

DAVID B. SMITH

Duluth, MN

I do. Unfortunately, no two people exactly agree on what that means. In my view, and as nearly as I can tell in that of most of our readers, science fiction is primarily to entertain and secondarily to explore ideas about all aspects of our kind (sentient beings) and the entire range of things we might encounter in our interactions with the universe. This includes things like, "How can a society be organized and what would the consequences be for its inhabitants?" The inheritance question was an example of that, and I seriously doubt that much of what we said about it here would have found a home in any existing business or news magazine. In any case, the letters column belongs to the readers, and I have little choice but to assume that any subject that generates a large amount of reader mail is of interest to a large number of readers. Anybody who would rather see it devoted to topics which haven't been getting much attention has an obvious recourse: write his own letters about those. ■

(continued from page 177)

46. Ur, cell; Akai; leg, win = Ursula K. Leguin
47. will yam; "10" = William Tenn
48. ray; brad, bury = Ray Bradbury
49. algae's; buttress = Algis Budrys
50. G; yodel; ani = Joe Delaney
51. spied her; robin's son = Spider Robinson
52. genie; robbin' sun = Jeanne Robinson
53. and drew; off it = Andrew Offut
54. spy dear; rah, bin, sin = Spider Robinson
55. barb; aspirin = Bob Asprin
56. linin; abbey = Lynn Abbey

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

CLASSIFIED MARKET PLACE

ANALOG — published monthly. CLASSIFIED AD rate is $2.40 per word — payable in advance — (15 word minimum). Capitalized words 40¢ per word additional. To be included in the next issue please send order and remittance to I. M. Bozoki, Classified Ad Manager, DAVIS PUBLICATIONS, INC., 380 Lexington Ave., New York, N.Y. 10017.

ART

MOVIE POSTERS: Vintage and "Current". Hitchcock, Sci-Fi, Mysteries: 1,000's available: ORDER IMMEDIATELY. (808) 980-1130. Catalog $2.00. Artistic Dimensions, 12115 Magnolia Blvd., North Hollywood, CA 91607.

BARGAINS

FLY FREE WORLDWIDE on Major Airlines. Drive Luxurious cars. Complete details only $5.00 (WORTH THOUSANDS) Joseph McWade, 2D Serpentine Plaza, Clinton, New Jersey 08809.

BOOKS & PERIODICALS

SCIENCE Fiction/fantasy. Free catalog of pulps, digests, paperbacks, hardcovers. Collections also purchased. Ray Bowman, Box 5845A, Toledo, Ohio 43613.

ALL Available paperbacks, hardcovers supplied quickly & efficiently. Worldwide service since 1973. Quarterly catalogue, free US/CANADA; $1 elsewhere. THE SCIENCE FICTION SHOP, 56 EIGHTH AVE., NY, NY 10014.

CHICAGO-NEBULA BOOKS has the largest selection of new SF in Chicago. Open 7 days. 6929 North Clark Street.

FREE catalog SF and Fantasy, Hardcover, Paperback 1st Editions, PELANOR Books, P.O. Box 3920, Styvesant Plaza, Albany, N.Y. 12203.

COMPUTERS & SOFTWARE

TRIVEAX! Three computerized Science Fiction Trivia Games. Over 5200 Questions! IBM-PCs, Compatibles or Commodore 64. $39.95, Visa, MasterCard, Check. Triveax, Route 6, Box 338K6, Columbia, SC 29210. Phone order costs rebated! (808) 732-3197.

EMPLOYMENT INFORMATION

OVERSEAS U.S. JOBS AVAILABLE. Unlimited Opportunities. Write for application. Employers, Box 3239-MY, Gulf Shores, AL 36542 or call 205-968-2500.

MISCELLANEOUS

MIDDLE-Earth map—Full Color—Poster Size—Art Print Quality—Great Detail—Follow the Fellowship—$12.00—1745 12th Ave. So.—Seattle, WA 98144.

MONEYMAKING OPPORTUNITIES

"HUNDRED$ WEEKLY"! GUARANTEED PROCESSING $TAMPED ENVELOPES! $TART IMMEDIATELY! FREE DETAILS! WRITE: MJG-DPG, AMBLER, PA 19002.

CAN you stuff 1000 envelopes for $500.00 weekly? Send Six 22¢ stamps. Blumes, Box 460159, Garland, Texas 75046.

THERE IS NO CHARGE FOR THE ZIP CODE: please use it when ordering merchandise from classified advertisements. You'll receive faster delivery.

OF INTEREST TO ALL

FREE PRIVACY CATALOG. Cash income opportunities. Asset protection. Secret loans. New identity. Eden, Box 8410-AD, Fountain Valley, CA 92728.

PERSONAL

SINGLE? Widowed? Divorced? Nationwide introductions! Refined, sincere people, 18-80. Identity, Box 315-DT, Royal Oak, Michigan 48068.

TAPES & CASSETTES

OLD RADIO AND TV ON TAPE. Huge selection of audio and video. Catalog $2.00. Nostalgia, Box 268-DP, Glen Cove, N.Y. 11542.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

a calendar of analog upcoming events

31 October-3 November
WORLD FANTASY CONVENTION at Doubletree Hotel, Tucson, Ariz. Guest of Honor—Stephen R. Donaldson, Special Guest—Evangeline Walton, Artist Guest of Honor—Michael Hague, TM—Chelsea Quinn Yarbro. Registration—$40. Info: 1985 World Fantasy Convention, Box 27201, Tempe AZ 85282. (602) 968-5673.

1-3 November
NOVACON 15 (British SF conference) at De Vere Hotel, Coventry, Eng. Guests of Honour—Dave Langford and James White. Info: Navacon 15, % Graham Poole, 86 Berwood Farm Road, Wylde Green, Sutton Goldfield, West Midlands B72 1AG, U.K.

1-3 November
NOVACON 3 (Pennsylvania SF conference) at Yorktown Hotel, York, Penna. Guest of Honor—Samuel R. Delany. Info: Novacon 3, Box 41, Marietta PA 17547.

8-10 November
ORYCON '85 (Oregon SF conference) at Hilton Hotel, Portland, Ore. Guest of Honor—Somtow Sucharitkul, TM—Steven Barnes. Info: Orycon '85, Box 5703, Portland OR 97228.

8-10 November
CONCLAVE X (Michigan area SF conference) at Plymouth Hilton, Plymouth, Mich. Guests of Honor—Poul and Karen Anderson, Fan Guest of Honor—Mark Evans. Registration—$14 until 25 October, $16 at the door. Info: Waldo & Magic, Inc., Box 2915, Ann Arbor MI 48106.

8-10 November
TUSCON 12 (Arizona SF conference) at Executive Inn, Tucson, Ariz. Guest of Honor—Vernor Vinge, Fan Guests of Honor—M.R. Hildebrand and Bruce D. Arthurs. Registration—$15 until 1 October, $20 at the door. Info: TusCon 12, Box 26822, Tucson AZ 85726.

8-10 November
SCI-CON 7 (Tidewater area SF conference) at Sheraton Beach Hotel, Virginia Beach, Va. Guest of Honor—Harlan Ellison, Artist Guest of Honor—Stephen Hickman, Fan Guest of Honor—Arthur Hlavaty. Registration—$15 until 15 October, $18 at the door. Info: SciCon 7, % HaRoSFA, Box 9434, Hampton VA 23670. Include S.A.S.E.

15-17 November
CONTACT (Indiana SF conference) at Airport Sheraton Inn, Evansville, Ind. Guest of Honor—Jack L. Chalker, Fan Guest of Honor—Rusty Hevelin, MC—Wilson "Bob" Tucker, Artist Guest of Honor—Robert Daniels, Gaming Guest of Honor—Penny Petticord, Comet Guest of Honor—Halley's Comet. Registration—$10 until 1 November; $12 thereafter. Info: River City Science Fiction Association, Box 3894, Evansville IN 47737. (812) 858-5419.

18-22 November
International Laser Science Conference at Dallas, Texas. Info: A.P.S., 335 East 45th Street, New York, NY 10017.

29 November-1 December
LOSCON 12 (Los Angeles area SF conference) at the Pasadena Hilton, Pasadena, Calif. Guest of Honor—Robert Silverberg, Guest of Honor in Absentia—Daniel Manus Pinkwater, Fan Guest of Honor—Terry Carr. Registration—$17.50 until 1 November, $20 at the door. Info: LOSCON 12, % LASFS, 11513 Burbank Blvd., North Hollywood CA 91601.

28 August-1 September 1986
CONFEDERATION (44th World Science Fiction Convention) at Atlanta, Georgia. Guest of Honor—Ray Bradbury, Fan Guest of Honor—Terry Carr, TM—Bob Shaw Registration—$25 supporting; $45 until 1 August 1985. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: ConFederation, 2500 North Atlanta Street #1986, Smyrna GA 30080. (404) 438-3943.

—Anthony Lewis

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

Explore new worlds beyond the limits of time and space.

†1529 Spec. ed

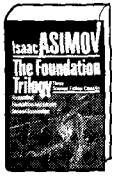
5504 Spec. ed.

1362 Pub. ed. $14.95

0356 Pub. ed. $17.95

0075 The First 5 Amber Novels. 2 vols. Comb. pub. ed. $32.30

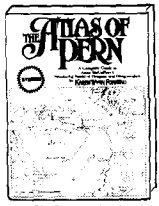
1420 Includes the First, Second, and Third Books. Spec. ed.



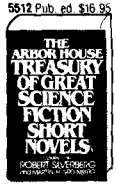
6221 Foundation; Foundation and Empire; Second Foundation. Pub. ed. $17.95

1784 The Space Merchants; The Merchants' War. Comb. pub. ed. $25.90

5512 Pub. ed. $16.95



1586 Pub. ed. $19.95



9076 Pub. ed. $19.95

1685 Pub. ed. $12.95

1719 Pawn of Prophecy; Queen of Sorcery; Magician's Gambit. Spec. ed.

1669 Castle of Wizardry; Enchanter's End Game. Spec. ed.

Take any 5 for $1 WITH MEMBERSHIP.

SEE OTHER SIDE FOR ADDITIONAL SELECTIONS.

† Copyright © 1984 by Paramount Pictures Corporation. STAR TREK is a Trademark of Paramount Pictures Corporation Registered in The U.S. Patent and Trademark Office. All Rights Reserved.

How the Club Works:

You'll receive your 5 books for only $1 (plus shipping and handling) after your application for membership is accepted. We reserve the right to reject any application. However, once accepted as a member, you may examine the books in your home and, if not completely satisfied, return them within 10 days at Club expense. Your membership will be cancelled and you'll owe nothing.

About every 4 weeks (14 times a year), we'll send you the Club's bulletin, *Things to Come*, describing the 2 coming Selections and a variety of Alternate choices. In addition, up to 4 times a year you may receive offers of special Selections, always at low Club prices. If you want the 2 Selections, you need do nothing; they'll be shipped automatically.

If you don't want a Selection, prefer an Alternate, or no book at all, just fill out the convenient form always provided and return it to us by the date specified.

We allow you at least 10 days for making your decision. If you do not receive the form in time to respond within 10 days and receive an unwanted Selection, you may return it at our expense.

As a member you need buy only 4 books at regular low Club prices during the coming year. You may resign any time thereafter or continue to enjoy Club benefits for as long as you wish. One of the 2 Selections each month is only $4.98. Other Selections are higher, but always much less than hardcover publishers' editions—up to 65% off. The Club offers more than 300 books to choose from. A shipping and handling charge is added to all shipments. Send no money now, but do mail the coupon today!

Note: Prices shown are publishers' edition prices.

SCIENCE FICTION BOOK CLUB®

Dept. AS-237, Garden City, NY 11530

I want the best SF in or out of this world! Please accept my application for membership in the Science Fiction Book Club. Send me the 5 books I have numbered in the boxes below, and bill me just $1 (plus shipping and handling). I agree to the Club Plan as described in this ad. I will take 4 more books at regular low Club prices in the coming year and may resign any time thereafter. SFBC offers serious works for mature readers.

1.	2.	3.	4.	5.

Mr.
Ms._____
(Please print)

Address_____Apt. #_____

City_____

State_____Zip_____

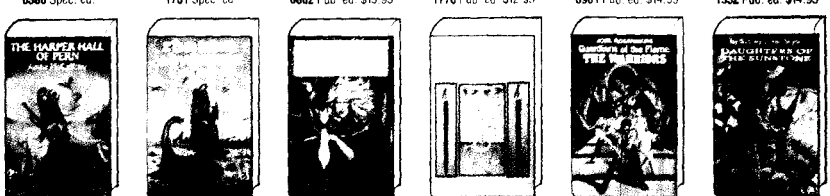
If under 18, parent must sign._____

The Science Fiction Book Club offers its own complete hardbound editions sometimes altered in size to fit special presses and save you even more. Members accepted in U.S.A. and Canada only. Canadian members will be serviced from Canada. Offer slightly different in Canada. 38-S231R

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED

1099 Pub. ed. $15.95 | **0109** Pub. ed. $16.95 | ***1164** Spec. ed. | **1339** Pub. ed. $15.95 | **3533** Pub. ed. $15.95 | **1271 Pub. ed. $14.95**

0380 Spec. ed. | **1701** Spec. ed. | **0802** Pub. ed. $15.95 | **1776** Pub. ed. $12.95 | **0901** Pub. ed. $14.95 | **1552 Pub. ed. $14.95**



0992 Dragonsong; Dragonsinger; Dragondrums. Comb. pub. ed. $38.85

0869 Dinosaur Planet; Dinosaur Planet Survivors. Spec. ed.

0752 Elric of Melniboné; The Sailor on the Seas of Fate; The Weird of the White Wolf. Spec. ed.

1172 The Vanishing Tower; The Bane of the Black Sword; Stormbringer. Spec. ed.

5520 The Sleeping Dragon; The Sword and the Chain; The Silver Crown. Spec. ed.

0877 Darkchild; *Bluesong*; Starsilk. Spec. ed.

1

WITH MEMBERSHIP

See other side for coupon and additional Selections.

THE SCIENCE FICTION BOOK CLUB®

38-S231R

***Explicit scenes and/or language may be offensive to some.**

Note: Prices shown are publishers' edition prices.

LICENSED TO UNZ.ORG
ELECTRONIC REPRODUCTION PROHIBITED